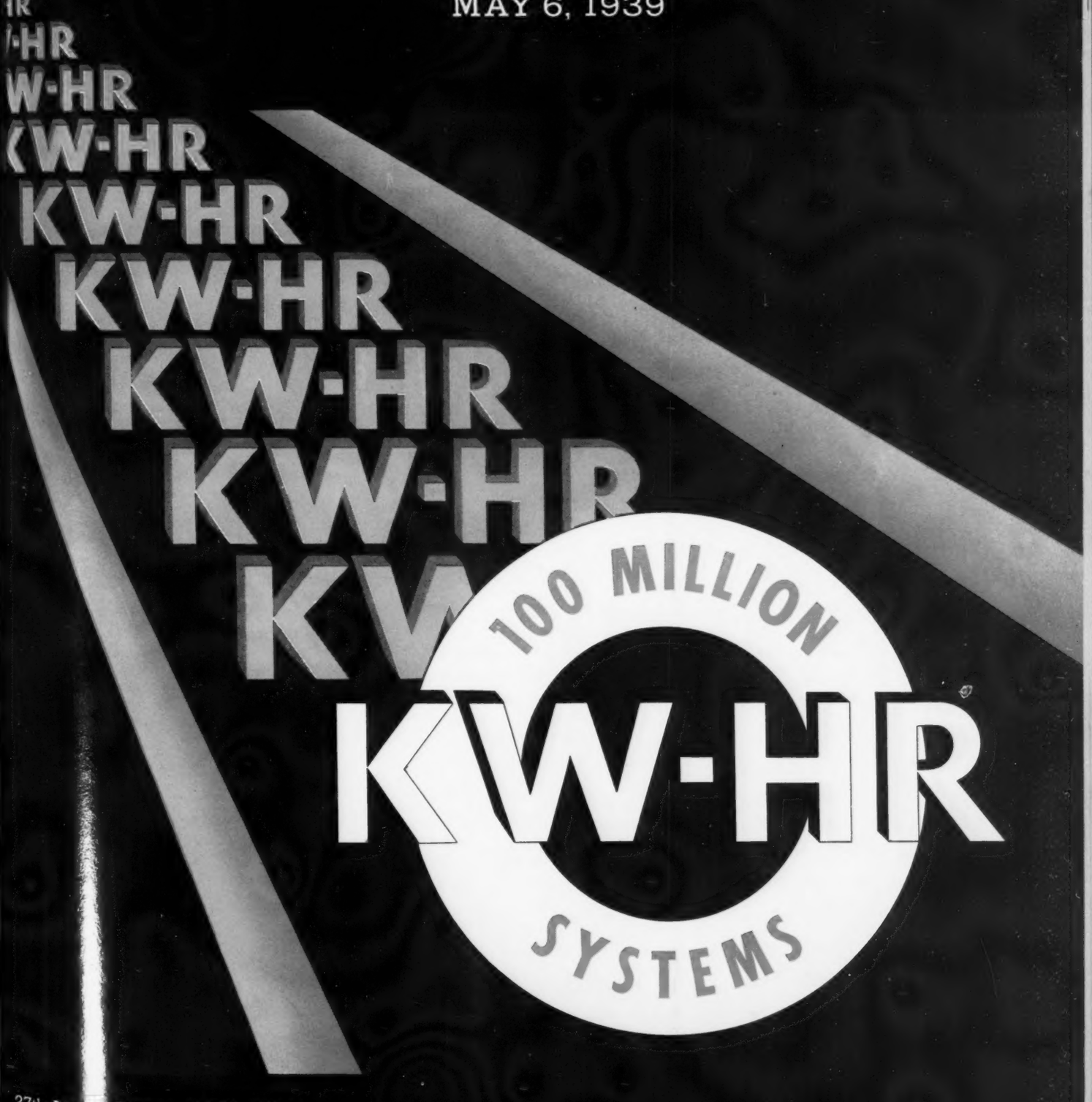
Electrical World

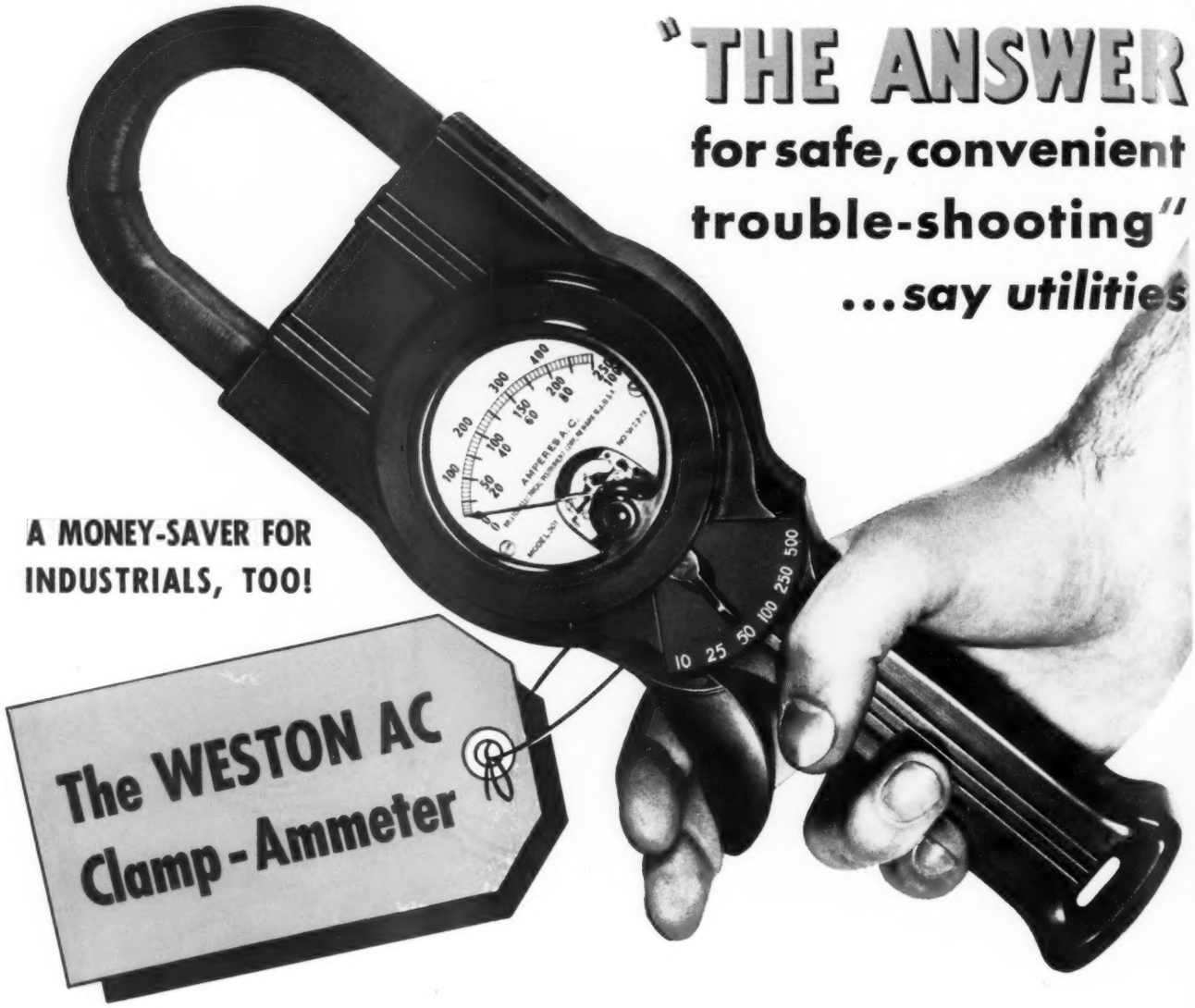
MAY 6, 1939



27th Ann[ual] Survey of 100 million kilowatt-h[our] systems a supplement to this issu[e]

PRICE O[NE] DOLLAR PER COPY

"THE ANSWER for safe, convenient trouble-shooting" ...say utilities



A MONEY-SAVER FOR INDUSTRIALS, TOO!

The WESTON AC Clamp-Ammeter

Here's an instrument built to utility specifications for *safety, ruggedness, accuracy and versatility*. With 6 current ranges, all changeable while the meter is in circuit, *plus* its many safety features, it provides a broader scope of usefulness for distribution problems overhead and underground.

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Complete information on the WESTON Clamp-Ammeter can be had from the WESTON representative in your vicinity, or by writing to Weston Electrical Instrument Corporation, 578 Frelinghuysen Ave., Newark, N. J.

OUTSTANDING FEATURES

6 current ranges . . . 10/25/50/100/250 and 500 amperes. Higher ranges on special order.

For insulated or non-insulated conductors up to 2" diameter.

Accuracy guaranteed within 3% between 50 and 70 cycles.

Sturdy bakelite case, handle and trigger . . . for maximum safety.

Clamping jaws heavily insulated . . . protects operator . . . prevents short circuits.

Instrument quickly detachable for remote indications.

WESTON *Instruments*

Federal Protective Power

A few months ago the Supreme Court in the Consolidated Edison N.L.R.B. case ruled that although the utility's operations were wholly intrastate the federal agency had jurisdiction under the Wagner Labor Relations Act. To our lay mind the decision virtually stamped every electric utility an interstate agency, reaching further than regulation of labor relations. To the legal mind, however, the decision merely recognized the existence of the federal power to protect interstate commerce from interference or injury arising from interstate activities.

Whether you call it "federal protective power" or "interstate commerce," it is the effect upon the utility business that is of primary importance. Did the Supreme Court in the case definitely establish the "federal concern" in utility matters to the point of exercising the federal protective power, even though the amount of business involved was a relatively small fraction of the total? We do not find ourselves alone in thinking that it did.

Only last week the Federal Power Commission apparently had some such idea in mind when it released a report on ten cases of major breakdown of electric service in various parts of the country. The report states that whether the breakdown is purely local and remote from state lines or affects large areas in several states, it invariably seriously interferes with interstate commerce and federal activities. Involved in the ten cases was interference with the following services: Mails, railways, telegraph, airplanes, radio signals, lighthouses, shipbuilding, federal hospitals and river and highway traffic.

The report in emphasizing the need for immediate protection states:

> As loads build up and generating station capacities and machine sizes increase, while the power is still handled at switching stations that remain in substantially the same condition as when originally built during the war or post-war period, the equipment at these points becomes progressively more inadequate, and it is reasonable to suppose that breakdowns, such as those discussed above, will become increasingly common unless there should be a corresponding and speedy modernization of structures and equipment at all switching points.

This report would appear to lay the groundwork for a campaign to force the utilities to start spending the widely publicized billion dollars a year for modernization and expansion. Whether such a campaign would be embraced in, or be in addition to, the demands to be made by the National Defense Committee on Power is something for speculation.

Of course this report is but the opinion of the Federal Power Commission. Nevertheless, it is an opinion which the utilities probably before long will be asked to accept. And if they do, thereby adding federal regulations of service maintenance to labor relations, what difference does it make whether it is done under the banner of interstate operations or federal protective power?

BOOSTERS PAY PROFITS

G. F. DEQUINE, *Indiana & Michigan Electric Company, South Bend, Ind.*

APPLICATION of automatic voltage boosters to rural feeders, single phase or three phase, maintains the voltage of the regulated portion of the line within certain predetermined limits. They take the valleys out of the voltage chart (Fig. 1). Dim electric lights, overheated motors, radios without volume, as well as slow heating elements—all these resulting from low voltage or valleys in the voltage chart—are just as annoying on the farm as they are in the city. The first dividend paid by automatic voltage boosters, therefore, is paid in the form of satisfied customers and their good will.

The second dividend, entirely incidental to the first, is paid in the form of recovered gross revenue received from the regulated line. (Recovery, as used herein, refers to the recovery of gross revenue, kilowatt-hours or kilowatt load that otherwise would have been lost had an automatic voltage booster not been installed.) The extent of this recovery depends upon the type of load on the regulated line during periods of voltage boost. That is, it depends upon whether the load is purely a resistance load, such as lights, radios and all forms of heating elements, or purely a motor load or a combination of the two types of loads, and on the ratio of the two types in the combination.

It is agreed that a straight resistance load will vary as the square of the voltage applied. This statement will apply, reasonably, to a load consisting of electric lights, radios and all forms of heating elements or any combination of these.

A load, or a definite kw. demand, consisting of electric motors only, is not materially affected by an increase or decrease in voltage, within reasonable limits. This type of load must, therefore, be eliminated when calculating the recovery in kw.-hr. or kw. load resulting from a maintained voltage.

The recovery in kw. load during a 10 per cent voltage boost, depending upon the type of load on the regulated line, can vary between the limits of zero and 21 per cent of the kw. load before the boost was applied. Likewise, the kw. recovery during a 5 per cent voltage boost can vary be-

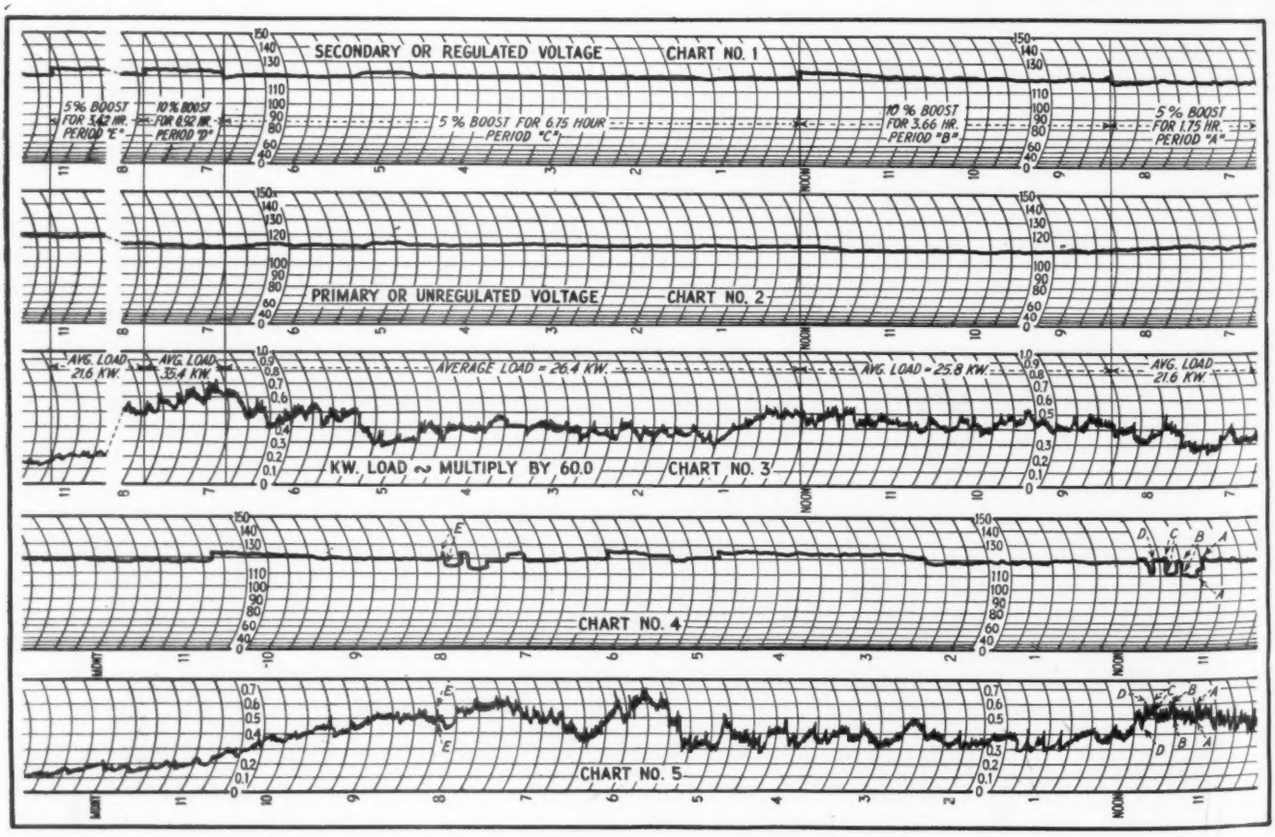

SECONDARY OR REGULATED VOLTAGE
CHART NO. 1
5% BOOST FOR 3.42 HR. PERIOD "E"
10% BOOST FOR 0.92 HR. PERIOD "D"
5% BOOST FOR 6.75 HOUR PERIOD "C"
10% BOOST FOR 3.66 HR. PERIOD "B"
5% BOOST FOR 1.75 HR. PERIOD "A"
PRIMARY OR UNREGULATED VOLTAGE
CHART NO. 2
AVG. LOAD 21.6 KW.
AVG. LOAD 35.4 KW.
AVERAGE LOAD = 26.4 KW.
AVG. LOAD = 25.8 KW.
AVG. LOAD 21.6 KW.
KW. LOAD ~ MULTIPLY BY 60.0
CHART NO. 3
CHART NO. 4
CHART NO. 5
MIDNT
NOON

Fig. 1—Primary and secondary voltmeter charts and wattmeter chart (simultaneous) on a 5-kva. voltage booster

ON VOLTAGE REGULATION

One dollar in booster investment defers necessity for spending $25 on rural service line reconstruction — Dividends from booster installation, in recovery of load and revenue, will pay entire cost in less than four years and are only incidental to the main purpose, which is improvement of service to customers

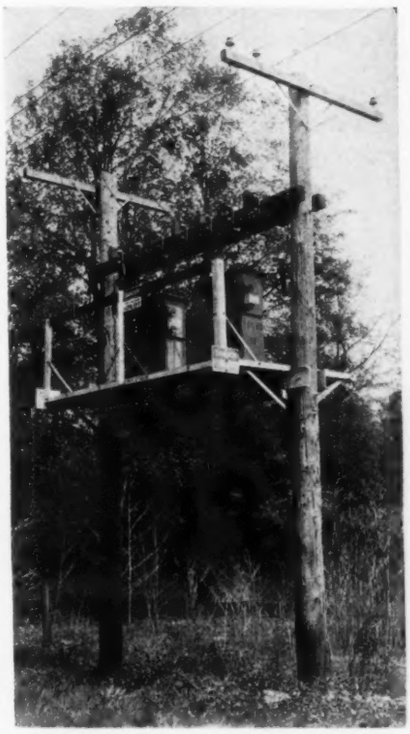


Fig. 2—Two 10-kva. voltage boosters installed on a three-phase rural feeder

tween the limits of zero and 10.25 per cent. Table I shows the percentage recovery in kw. resulting from a 5 per cent voltage boost, for various percentages of kw. recovery resulting from a 10 per cent voltage boost.

The actual recovery in kw. load resulting from a 10 per cent boost in voltage can be determined by test. Referring to Fig. 1, charts 1, 2 and 3 were taken on a 5-kva., single-phase voltage booster, regulating a typical rural line, 18 miles in length and serving 93 customers.

Charts 4 and 5 were taken on Wednesday, September 22, on the same voltage booster, on the same line and on the day after charts 1, 2 and 3 were taken, which was Tuesday, September 21, 1936. In this case, however, a 10 per cent voltage boost was manually applied at points "A," "B," "C" and "E" to determine what recovery in kw. load was obtained. At point "D" the voltage was dropped 10 per cent. At the instant the 10 per cent boost was applied the wattmeter was carefully watched to note the recovery in kw. load. The load was rather fluctuating, due to automatic water pumps and similar loads; however, assimilation of data recorded, with a careful analysis of chart 5, indicates the following recoveries in kw. load: A, 23 per cent, which is high; B, 9.3 per cent; C, 16.0 per cent; D, 20 per cent, and E, 8 per cent, resulting in an average recovery of 15.2 per cent in kw. load, by applying a 10 per cent voltage boost to this particular line. This recovery indicates an average load, of which approximately 70 per cent consisted of lighting, heating and radio load and 30 per cent of motor load.

The recovery in kw.-hr. during periods of voltage boost not only depends upon the recovery in kw. load during the same periods but it also depends upon the percentage which the thermostatically controlled heating load is of the total heating, lighting and radio load. This is true because, while the kw. demand of a thermostatically controlled heating load increases as the square of the voltage, the load is on for shorter periods of time.

There may be, however, a slight recovery in kw.-hr. of this type of load, since the average temperature of a thermostatically controlled heating load, such as an oven or a water heater, will be higher during voltage boosts than when the voltage is considerably below normal. Recovery in kw.-hr. from this type of load is so slight that, for all practical purposes, it should be eliminated when considering the recovery in kw.-hr. during periods of voltage boost.

Motor loads are eliminated from consideration of kilowatt recovery as well as kw.-hr. recovery by actual test and by applying the proper set of percentages appearing in Table I.

Thermostatically controlled heat-

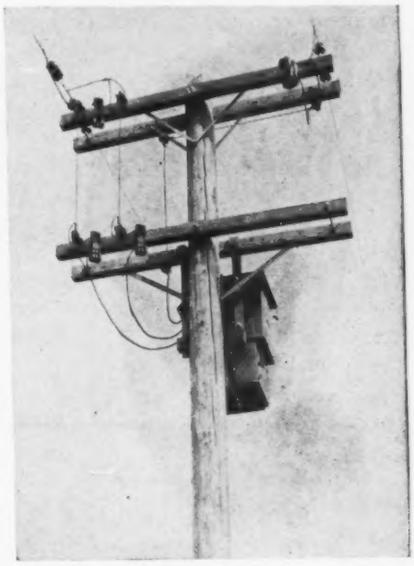


Fig. 3—Installation view of 5-kva. voltage booster

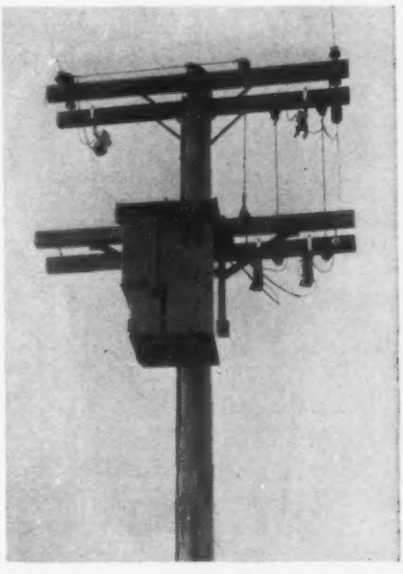


Fig. 4—Front view of 5-kva. voltage booster showing method of installation

Table I—Tabulation showing per cent recovery in kilowatt load by applying a 5 per cent voltage boost if a 10 per cent voltage boost results in certain percentages of recovery in kw load

Per Cent Boost	Recovery in Kw., per Cent									
10	2	4	6	8	10	12	14	16	18	20
5	0.98	1.95	2.9	3.9	4.9	5.9	6.8	7.8	8.8	9.8

ing loads are eliminated from consideration of kw.-hr. recovery by applying the ratio of the non-regulated heating load to the total resistance (lights, radios and all forms of heating elements) load; to the particular set of percentages appearing in Table I which apply to the feeder under consideration.

Table II gives percentages of kw.-hr. recovery during periods of 5 and 10 per cent voltage boost at various recoveries in kw. load (by applying a 10 per cent boost) and also at various percentages which the non-regulated resistance, or heating, load is of the total resistance load.

Recovery in gross revenue from a voltage-regulated feeder depends upon the actual kw.-hr. recovery as well as upon the last billing step earned by the various customers on the regulated feeder.

As stated above, charts 1, 2 and 3, Fig. 1, were taken on September 21, 1936. Demand chart 3 should, therefore, represent an average daily demand chart for the year. This assumption, if anything, is conservative. Chart 1 indicates that on this day there were five definite periods of voltage boost—periods "A," "B," "C," "D" and "E." Also, as stated above, actual test showed an average recovery in kw. of 15.2 per cent with a 10 per cent voltage boost on this feeder. A recovery in kw. of 12 per cent at 10 per cent boost and 5.9 per cent at 5 per cent boost is assumed in the following calculations, to further the interests of conservatism.

It is necessary to know the ratio of the non-regulated resistance load (including all lighting, radio and non-regulated heating loads) to the actual load, excluding motors, to permit the exact calculation of kw.-hr. recovery during voltage boost periods on any regulated feeder. This would require a detailed study of every feeder under consideration; however, it appears that 40 per cent is a very conservative figure.

By referring to Table II, the above conditions show a kw.-hr. recovery of 4.8 per cent at 10 per cent boost and 2.95 per cent at 5 per cent boost. These percentages applied to the average kw. load, chart 3, Fig. 1, during a period of boost multiplied by the duration of the boost in hours, results in the following kw.-hr. recoveries: Period A, 0.89; B, 4.53; C, 4.20; D, 1.56 and E, 1.74. These figures represent a total of 12.92 kw.-hr. recovered during this average day, or a total yearly recovery of 4,715 kw.-hr., which at an average of 2½ cents per kw.-hr. represents a total yearly recovery in gross revenue of $117.88—a handsome dividend, or return, paid by the investment involved in a 5-kva. voltage booster.

This cash dividend, depending upon the type of load on the regulated feeder, can't help but show up and, more than that, it is incidental to the original intent.

[*Continued on page 123*]

Table II—Recovery in energy use during periods of 5 per cent and 10 per cent voltage boosts, at various percentages which the non-regulated resistance load is to the total resistance load; also at various percentages of recovery in kw. load by applying a 10 per cent voltage boost to the line under study

Per Cent Non-Regulated Resistance Load is of Total Resistance Load at Time of Boost	Per Cent Boost	Recovery in Kw.-Hr. (Expressed in per cent) at Various per cent Recoveries in Kw. Load by Applying a 10 per cent Boost									
		2	4	6	8	10	12	14	16	18	20
10	5	0.1	0.19	0.29	0.39	0.49	0.59	0.68	0.78	0.88	0.98
	10	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
20	5	0.2	0.39	0.58	0.78	0.98	1.18	1.36	1.58	1.76	1.96
	10	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0
30	5	0.29	0.59	0.87	1.17	1.47	1.77	2.04	2.37	2.64	2.94
	10	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0
40	5	0.39	0.78	1.16	1.56	1.96	2.36	2.72	3.16	3.52	3.92
	10	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0
50	5	0.49	0.98	1.45	1.95	2.45	2.95	3.4	3.90	4.4	4.9
	10	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
60	5	0.59	1.17	1.7	2.34	2.94	3.54	4.08	4.74	5.28	5.9
	10	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0
70	5	0.69	1.37	2.0	2.74	3.44	4.13	4.76	5.53	6.15	6.86
	10	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.6	14.0
80	5	0.78	1.56	2.3	3.1	3.9	4.7	5.44	6.3	7.04	7.84
	10	1.6	3.2	4.8	6.4	8.0	9.6	11.2	12.8	14.4	16.0
90	5	0.88	1.76	2.6	3.5	4.4	5.3	6.1	7.1	7.9	8.8
	10	1.8	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.0
100	5	0.98	1.95	2.9	3.9	4.9	5.9	6.8	7.8	8.8	9.8
	10	2	4	6	8	10	12	14	16	18	20

Finds "Hot Stick" Work Good Practice

Long and varied experience with live-line maintenance proves it safe, economical and practical — Almost all kinds of line work can be handled hot with considerable saving in time and elimination of service outage

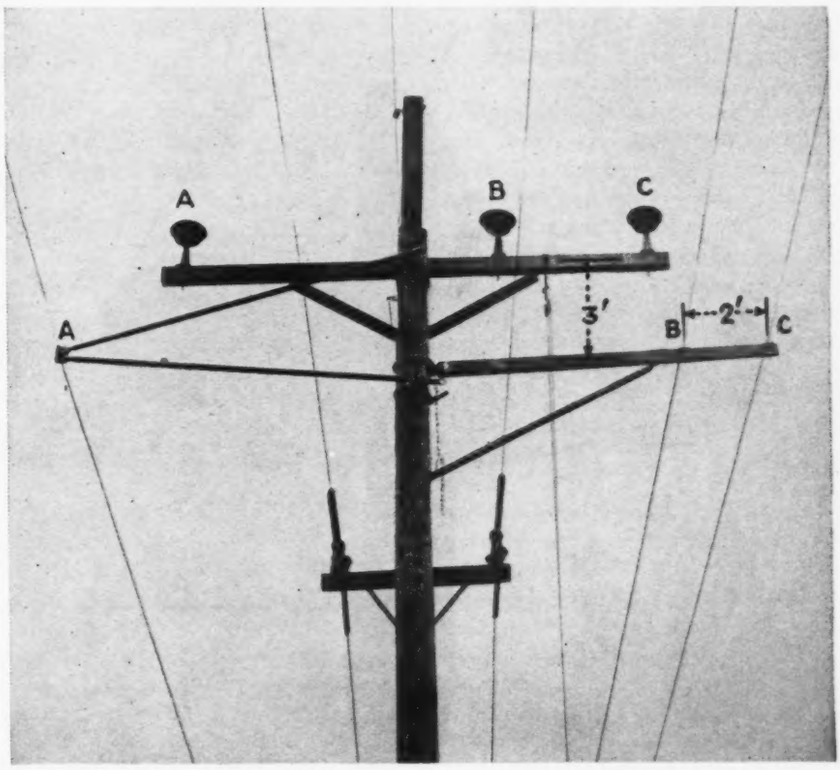
H. E. CLEMENTS, ***Distribution Engineer, Empire District Electric Company, Joplin, Mo.***

SAFETY AND value of "hot line" work has been definitely proven in the Empire District Electric Company at Joplin, Mo. We have been doing this type of work since 1928; at that time insulator changing on important transmission lines of 33 kv. which could not be killed was the only hot stick job done. On voltages of less than 33 kv. all of the work was done by killing the line or using rubber equipment. In 1931 a crew successfully changed an insulator on a 66-kv. line.

Due to the numerous serious accidents resulting from working 6,600- and 11,000-volt lines with rubber equipment, 5,000 volts was decided upon by the management, in 1934, as the dividing line. All circuits of more than 5,000 volts, if worked hot, were to be done with insulated sticks, yet, as we all know, merely stating a rule to change an operating practice does not get full acceptance overnight, nor does an organization immediately supply the necessary tools and instructions to comply with the change. On March 18, 1937, a lineman received an electric burn which resulted in seventeen days "lost time" while working on an 11-kv. line without "hot sticks." The same day another lineman received a fatal shock while working a 6,600-volt line with rubber gloves. This caused us to make a concentrated effort in operating rule enforcement and an educational drive in the manner of working "hot lines."

Operating Practice

In this section of the country the season of the year has no effect on our live-line operating practice, a clear day being the only requirement.



Method for setting out heavy conductors

To replace insulator A set out conductor A
To replace insulator B set out conductor B
To replace insulator C set out conductor B C
To replace bayonet set out conductor B C
To replace crossarm set out conductor A B C
To replace pole set out conductor A B C
To work on ground wire set out conductor B

Hot stick work, in a small way, such as an insulator replacement, is sometimes attempted in rainy weather under an extreme emergency.

At present most all kinds of line work can be done while the line is hot, which includes everything from an insulator replacement on a straight line pole to corner pole replacement, cutting in a few spans of new wire or substation work. Hot stick work is done by all line crews and some maintenance crews. The type of job which can be handled depends on the number of men in the crew and their equipment. Four of our 25 crews are equipped to handle all kinds of jobs. Standard, commercially available tools are used exclusively, with the exception of a tool we were forced to develop to install "clamp top" insulators. A well-known manufacturer, however, expects to put this tool on the market.

The live-line tools, including switch sticks, are numbered and given a personal inspection in regard to

safety and inventory once a year. All unsafe equipment is either junked or tagged for repair. The total investment in our live-line tools is slightly over $15,000.

Economy

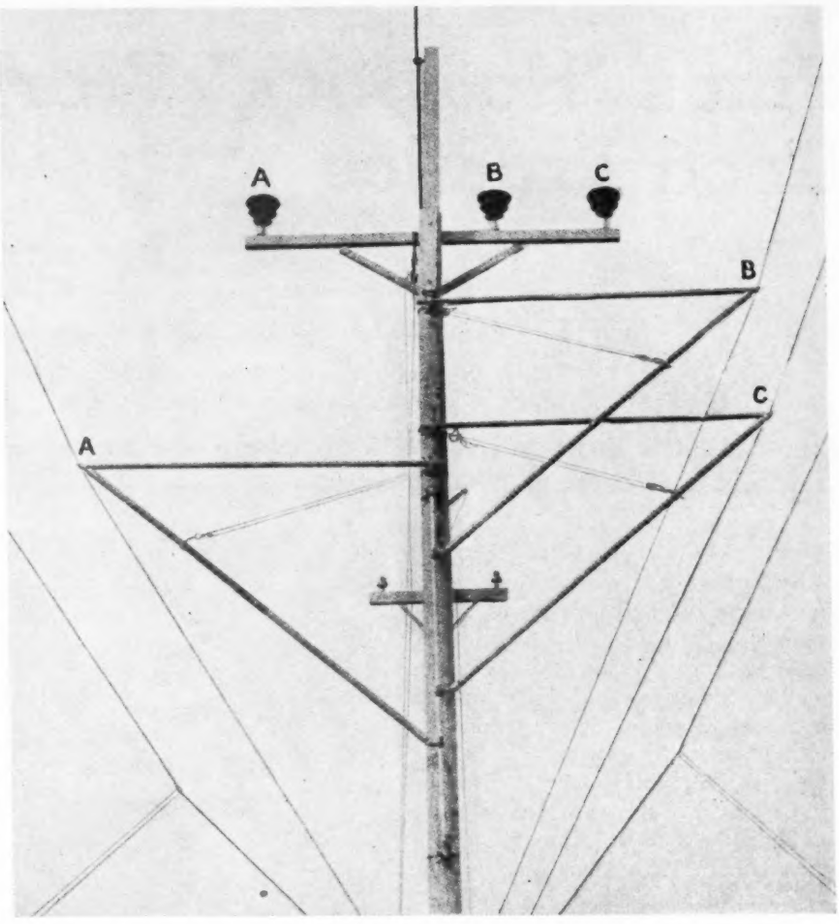
Whether a job should be done hot or cold depends on several factors: Can this section of line be killed without a service interruption? If not, what effect will it have in regard to customer good will and company revenue? Is this section of line an important tie between two or more generating stations, and will killing this section seriously affect system stability? Can the job be done hot more economically, consideration being given to the cost of obtaining line clearance, switching, grounding and again putting the line back into service? By considering these questions, an intelligent solution of any particular job can be made.

Due to the cost of getting a line ready to work dead, most small jobs can be done cheaper hot, while large jobs, such as rebuilding or road moves, can be done much cheaper on a dead line. However, in our system, we have a 66-kv. line connecting generating plants which is being rebuilt by hot stick methods so that the system can be kept in a normal operating condition. This line has a ¼-in. steel static wire, three No. 1/0 copper conductors, 66 kv.; three No. 4 copper conductors, 11 kv., and two No. 8 copperweld telephone wires. A crew of four men (including the foreman) could change out two poles a day working the line hot, whereas the same crew would average four poles a day if the circuits were dead.

Our experience in regard to time required to do a particular job is as follows:

Job	Type Line	Conductors	Crew	Man-Hours
Insulator change	Straight	All sizes	2	1
Insulator change	Vertical corner	All sizes	4	4
Crossarm change	Straight	Light	2	4
Crossarm change	Straight	Heavy	4	8
Pole change	Straight	Light	4	8
Pole change	Straight	Heavy	4	12
Pole change	Vertical corner	All sizes	4	40
Replace conductor span	Straight	All sizes	6	12

The above does not include time spent in traveling to and from the job. The number of men in a crew includes the foreman. For pole changes, the holes are considered already dug. The above circuits are three phase, any voltage. Light conductors permit the use of an auxiliary arm, which decidedly speeds up setting out conductors.



Method for setting out light conductors

To replace insulator A set out conductor A
To replace insulator B set out conductor B
To replace insulator C set out conductor B C
To replace bayonet set out conductor B C
To replace crossarm set out conductor A B C
To replace pole set out conductor A B C
To work on ground wire set out conductor B

Safety

The old adage "Familiarity breeds contempt" does not seem to apply to "hot stick" work. When a lineman uses hot sticks it is a constant warning that the circuit is dangerous and must be respected, otherwise he would get closer and use rubber equipment. The familiar buzz he hears, especially on the higher voltage circuits, is also a constant reminder. Then, too, the work is usually confined to one pole, under the direct supervision of a foreman who demands that safety rules govern the job. With these constant reminders the linemen get familiar with methods and equipment, but certainly develop no contempt for the energized conductors.

It should probably be clarified at this point that rubber equipment is by no means considered unsafe or unnecessary to our line crews. It plays a very important part when working circuits of less than 5,000 volts. Also, insulator hoods, line hose, blankets, when installed with hot sticks, are used on voltages up to 15 kv. as a barrier to guard against accidental contact in confined places such as switching poles, buckarm corners and substations.

Last year we developed and distributed to all foremen and linemen in our organization a "Live Line Manual" which we believe has been a beneficial contribution toward safety and efficiency. It incorporates approved methods, equipment, safety suggestions and rules for doing "hot stick" work. The accompanying illustrations are samples from this manual.

It is generally accepted by the linemen in our organization that "hot stick" work is the safest type of work they do. This statement is proven by the fact that no injury has resulted from the failure of any piece of "hot stick" equipment or its use.

How One REA Co-operative Is Working Out

Plea for tax reduction discloses a lack of earning power — Income is insufficient to pay operating expenses exclusive of debt service and of essential reserves

AUTHENTIC operating data for one of the earliest co-operatives financed by REA became available from an application for reduction of assessed valuation for 1938 made to the Tax Commission of Ohio by the Pioneer Rural Electric Co-operative, Inc., formed by a merger of three co-operatives in Champaign, Miami and Shelby counties. The application was dismissed by the commission in an order dated December 23, 1938. In January, 1939, the co-operative obtained from the United States District Court an order temporarily restraining the commission from certification of the assessment of the property of the co-operative. The quotations and data here presented are taken from a "Memorandum Submitted by the Taxpayer and by the Rural Electrification Administration on Behalf of the United States of America, a Creditor of the Taxpayer."

"It is respectfully submitted," says the report, "that the tentative valuation of the taxpayer's property for the year 1938 in the sum of $887,080 should be very greatly reduced."

The memorandum sets forth that the project, wholly financed through REA, owes the United States $1,184,272, which is secured by a 20-year first mortgage at 3 per cent, payable in equal monthly installments by December 1, 1956.

While setting forth in its plea that it operates in rural areas where service was consistently denied by the utility companies on the "sole ground that the business would be unprofitable," the co-operative states that it "has not at any time earned enough even to pay its operating expenses exclusive of the debt service and exclusive of essential reserves," that its success is being jeopardized by the prospect of continuing deficits, and that "this jeopardy may be relieved by an adjustment of the tax level that reflects the true earning power and true value of the property."

Gross operating revenues for 1937 were $88,111.83. Operating expenses, exclusive of interest and reserves for depreciation and future maintenance, were $88,084.35. Interest was $26,190.89 and reserves at 5 per cent of book value of fixed assets amounted to $50,567.

"It appears, therefore," the plea states, "that this first full year of operation showed a deficit of $76,731.32, equal to 87 per cent of its gross revenue." A summary of the profit and loss statement is shown in Exhibit A on this page.

"It is apparent," the plea goes on to say, "that some deficit will continue for a period of years. Although there has been a slight improvement, the trend is very slow; 3,231 customers have been connected, including almost all of the profitable business. In Exhibit B, hereto attached, is a profit and loss statement for the period from January, 1937, to August, 1938, inclusive. The average monthly deficit for the two years is as follows:

	Before Depreciation	After Depreciation
Year 1937 Average monthly deficit	$2180	$6394
Year 1938 Average monthly deficit	$1702	$6194

[*Continued on page 124*]

Exhibit "A"

Pioneer Rural Electric Co-operative, Inc.
Profit and Loss Statement
January 1, 1937, to December 31, 1937

Operating Revenue		$88,111.83
Operating Expenses		
Production Expense		
Power Purchases		$26,072.56
Distribution Expense		
Distribution Labor	$6,381.75	
Supplies and Expense	3,206.82	
Repairs to Overhead Lines	13,348.19	
		22,936.76
Undistributed Expense		416.34
Deferred Upkeep		
General Expense		
Salaries & Expense of Administrative Offices	$3,495.44	
Salaries & Expenses of Office Employees	1,919.70	
Rent	439.05	
Supplies & Expense	3,908.41	
Miscellaneous	4,325.60	
Meter Readings, Salaries & Exp.	686.04	
Collections, Salaries & Expense	2,595.10	
Consumers Accounting, Sal. & Exp.	780.00	
Advertising	63.48	
Insurance	1,939.12	
Uncollected Accounts	71.28	
		20,223.22
Taxes		18,038.34
Interest on Funded Debt		26,190.89
Total Operating Expenses		$114,275.24
Reserves for Maintenance and Depreciation (5% per annum of Book Fixed Assets)		50,567.91
Total Operating Expense and Reserves		$164,843.15
Net Income (Deficit)		$76,731.32

These figures do not include a net non-operating revenue of $456.95.

Exhibit "B"

Pioneer Rural Electric Co-operative, Inc.
Profit and Loss Statement
January 1, 1938, to August 31, 1938

Operating Revenue		$77,925.23
Operating Expenses		
Production Expense		
Power Purchases		22,695.08
Distribution Expense		
Labor	$4,987.28	
Supplies & Expense	1,186.49	
Mileage	355.79	
		6,529.56
Maintenance Expenses		
Labor	$7,567.60	
Supplies	2,421.77	
Mileage	392.84	
		10,381.91
Consumers Billing & Collecting Expense		
Salaries	$824.00	
Miscellaneous	188.52	
		1,012.52
General Expense		
Salaries	$4,822.65	
Miscellaneous	5,620.40	
		10,443.05
Insurance		1,084.63
Transportation Expense		1,422.14
Taxes		13,584.60
Interest on Funded Debt		24,390.62
Total Operating Expenses		$91,544.11
Reserves for Maintenance and Depreciation (5% per annum of Book Value of Fixed Assets. Adjusted for 8 month period.)		35,937.00
Total Operating Expenses and Reserves		$127,481.11
Net Income (Deficit)		$49,555.88

These figures do not include non-operating revenue of $940.66.

HIGH-INTENSITY LIGHT

E. B. KARNS, *Lighting Division, Westinghouse Electric & Manufacturing Company*

Center area has 81 ft.-candles

BELIEVED to be the highest ever used for football field lighting, an average of 59 ft.-candles over the entire playing area has been provided at Laidley Field, Charleston, W. Va. This is about 70 per cent more than "Class A" football field lighting—approximately 35 ft.-candles, by N.E.M.A. methods of calculation. In the center half the intensity rises to 81.8 ft.-candles, which is more than double "Class A" lighting.

Six towers carry a total of 160 Westinghouse closed type AV-20 floodlights with 1,500-watt PS-52 clear bulb general service lamps, spun aluminum reflectors (20-in. diameter) and polished surfaces finished by the "Alzak" process. Lenses are plain, clear, high quality, heat-resisting glass. When assembled the floodlight is dust-tight and weather proof.

Towers are of heavy galvanized steel of the four-leg type, approximately 4 ft. square. Cross arm mounting brackets are of cast iron, finished with baked enamel paint.

The three towers on the south side of the field are behind the stand, about 137 ft. from the side-line of the playing area. They provide a mounting height 110 ft. above the field level. Each end tower carries 28 floodlights, the center tower 30.

On the north side the center tower

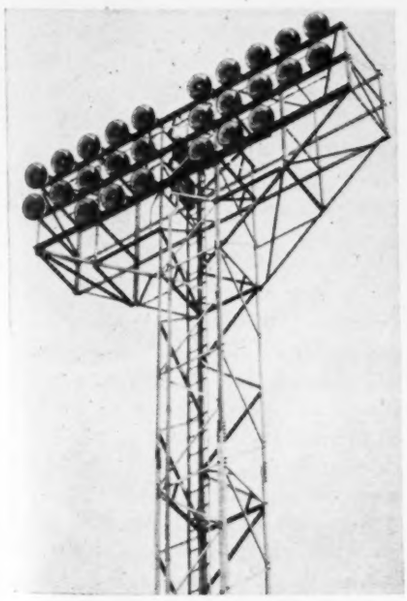
FOR PLAYING FIELD

Center of Laidley Field averages 81 ft.-candles and average over whole field is 59—Underground primary service to transformers mounted on light towers employed for 276 kw. load of 160 field floods and of others for illuminating stands and parking area

Floodlamps are about 110 ft. above level of field

is behind the stand, about 138 ft. from the side-line, and carries 30 units. The two end towers are set in, 88 ft. from the side-line, and support 22 floodlights at a mounting height 85 ft. above the field.

An underground primary distribution system is used with a 50-kva. transformer mounted on each tower approximately 30 ft. above the ground.



Conductors in conduit riser to fuse box—Load electrically balanced

From the substation to the primary metering and switching equipment overhead wiring is used. From this point underground cable is run to the first tower on each side of the field. Between the towers the primary is carried in conduit under the stand. All primary cable is RR-5,000-volt single conductor, I.P.E.C.A. Specifications, No. 6 AWG.

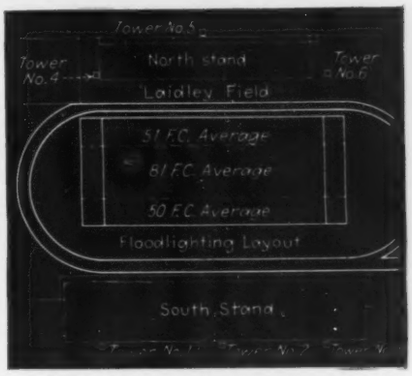
The secondary runs are three-wire, 115/230 volt. These are carried through 2-in. conduit from the transformer to a distribution panel at the top of the tower. At the top of each structure there are two panels in weatherproof steel cabinets to provide individual fusing for each floodlight. From this fuse box the circuit in conduit connects to floodlight leads through type EN and C 1-in. conduits with composition covers. The floodlights on each crossarm are electrically balanced.

Safety switches are conveniently located on each tower so any of the towers may be turned on or off as desired—as in the case of practice football, track, or other programs, not requiring all the field lights.

The total rating of the connected load is 240 kw., but since 105-volt lamps are used, operated at 10 per cent overvoltage, the computed load is 276 kw., the actual metered load is 274 kw.

In addition to the field lights floodlights are provided for lighting the stands before and after the game, as well as parking lot lights.

The total cost of the job was about $15,400, made up approximately as follows: Towers and erection, $4,580; all electrical material, $9,200; labor for electrical work, $1,700.



Floodlighting layout, Laidley Field

Tower No.	Mounting Height (Feet)	Dist. from Side-line (Feet)	No. of Units
1	108	137	28
2	107	137	30
3	106	137	28
4	80	88	22
5	106	138	30
6	80	88	22

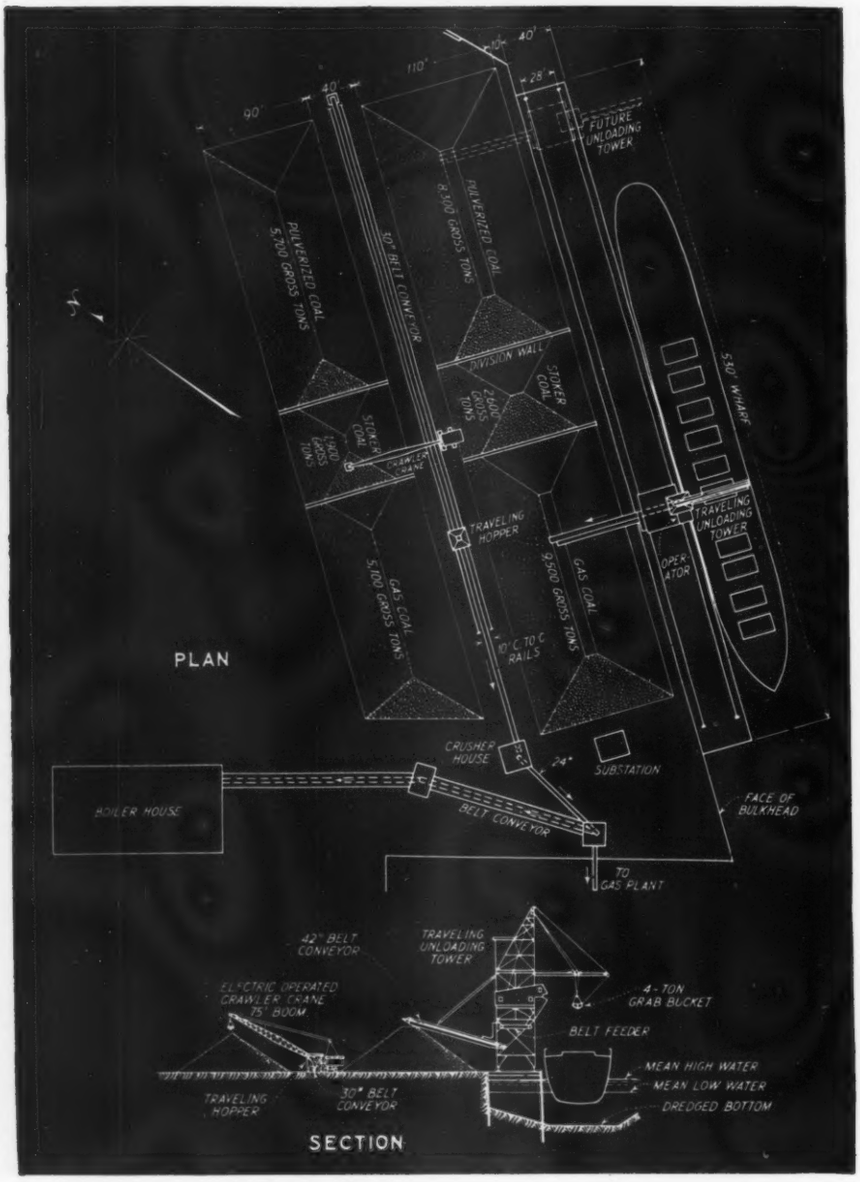
1,500-watt units, 105-volt lamps on 115-volt circuits—Total, 276 kw.

Coal Handling Demands Reliable Service

Full advantage of modern ideas in control and equipment is realized in new coal-handling facilities provided for Lynn utility in replacement of those destroyed by fire — Flexibility in unloading, storing and reclaiming a feature

R. S. REED and J. H. WELLS, ***Stone & Webster Engineering Corporation, Boston, Mass.***

WHEN A FIRE recently destroyed most of its tidewater wharf, two coal unloading towers and much of the conveying equipment, the Lynn Gas & Electric Company faced the problem of restoring permanent facilities to handle about 100,000 tons of coal a year at its electric generating station and gas plant. The Stone & Webster Engineering Corporation was engaged to design and supervise the construction of a new coal-handling installation in co-operation with the company's personnel, and the layout adopted well illustrates the importance of auxiliary electric service in meeting the varied power requirements flexibly, efficiently and in conjunction with greatly improved protection to insure against another fire.



General layout of coal-handling plant

Gas and Steam Coal

The gas and electric plants each consumes about half the coal handled annually by the system. Two classifications of steam coal are used; one for pulverized burning, the other for firing on underfeed stokers, and a third grade for gas production. A considerable amount of outdoor storage (25,000 to 30,000 tons at times) is advisable, in order that an uninterrupted supply of each kind of coal can be had. The electric generating station has a rating of 39,500 kw., there being four units, with the largest rated at 20,000 kw. and the smallest at 3,480 kw. The active boiler plant consists of three 400-lb. steam generators, of which two, installed ten years ago, deliver about 150,000 lb. of steam per hour each, the third being a 205,000-lb.-per-hour Riley boiler installed in 1936. A number of older 200-lb. boilers are maintained in reserve. Overhead bunkers have a capacity of 977 tons, or about three days' supply. Peak load of the plant, excluding purchased energy, was 19,300 kw. in December, 1938, and the plant generated 7,877,500 kw.-hr. that month.

Watt-hour meter records for December indicate that the following

Coal unloading tower with stacker boom at left

Crawler crane, traveling hopper and main belt conveyor

energy consumptions were required in coal handling:

	Handling from Ship to Storage		Handling from Storage to Plant	
	Tons	Kw.-Hr.	Tons	Kw.-Hr.
Gas coal ...	6,337	5,800	4,495	3,700
Steam coal ..	5,097	5,100	4,679	6,900
Totals	11,434	10,900	9,174	10,600

The average energy consumption required to unload, store and deliver coal to the steam plant bunkers was 2.5 kw.-hr. per ton.

There are 34 motors installed in the coal-handling system, with a total rating of approximately 931 hp., more than two-thirds of this connected load, or 674 hp., being associated with the operation of the coal tower, which unloads fuel from the ships berthed at the company's wharf and delivers to the storage and conveyor system.

Coal is received in boats of around 7,000 tons capacity in order to obtain low cargo rates per ton and all coal is stored uncrushed. The maximum depth of the storage piles is 35 ft. Coal reclaimed from the storage piles is crushed on the way to the power station and gas plant, the crusher being located ahead of the inclined conveyors so that lumps are reduced sufficiently in size to prevent their rolling backward down the conveyors. Under normal conditions it is necessary to deliver coal into the gas plant and steam boiler house at least every 24 hours.

Sampling is effected as coal comes from the boat in order to permit determinations of moisture content as received. The layout of the coal-conveying equipment contemplates the future addition to a silo above the crusher house so that high and low volatile coals may be blended for gas making.

The wharf is about 525 ft. long at the boat channel, the length being determined by the requirements of coal storage. Construction is open deck, mainly of concrete, with catwalks below, and in case fire breaks out it can be localized by bulkheads and promptly extinguished.

The unloading tower is operated by seventeen electric motors and has a capacity of 600 gross tons per

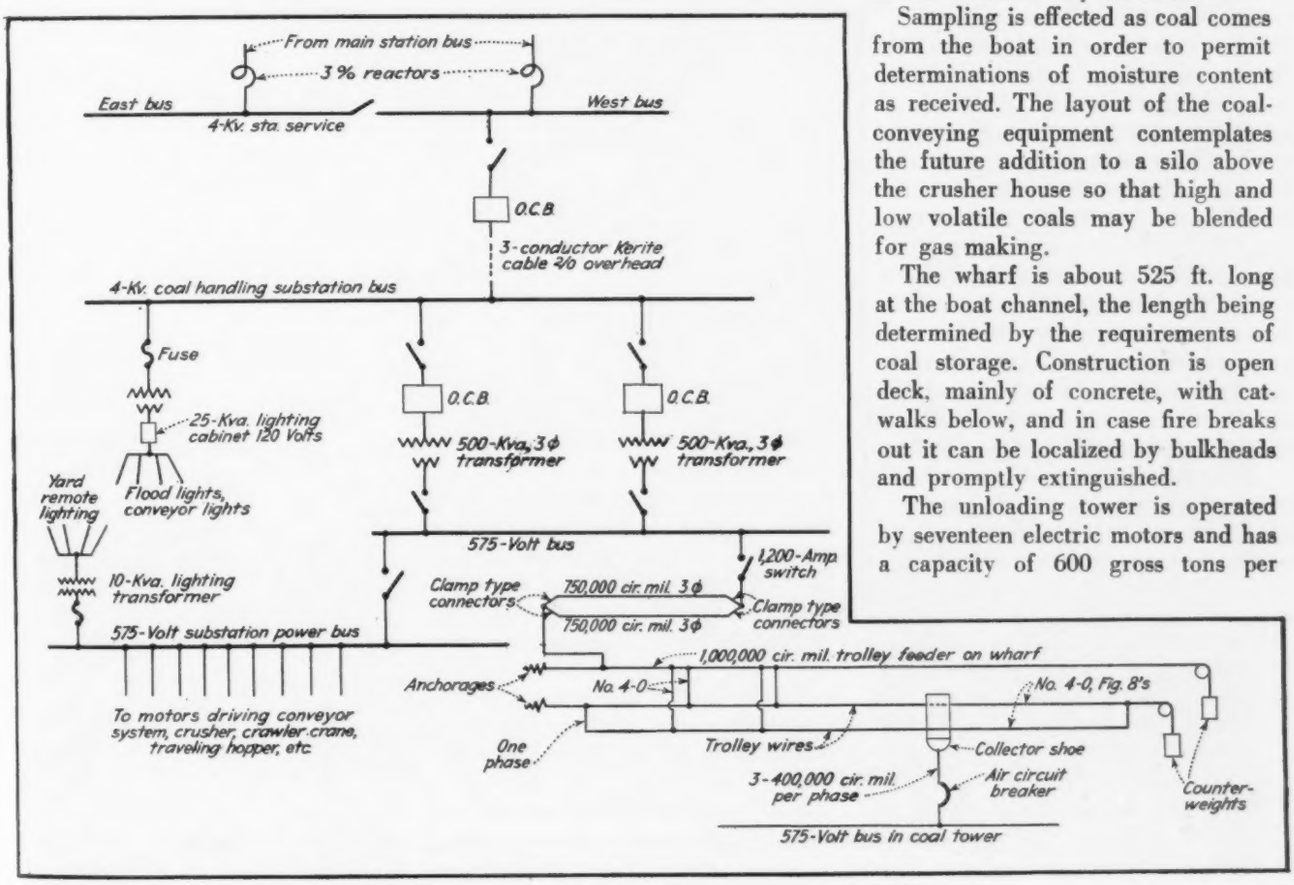
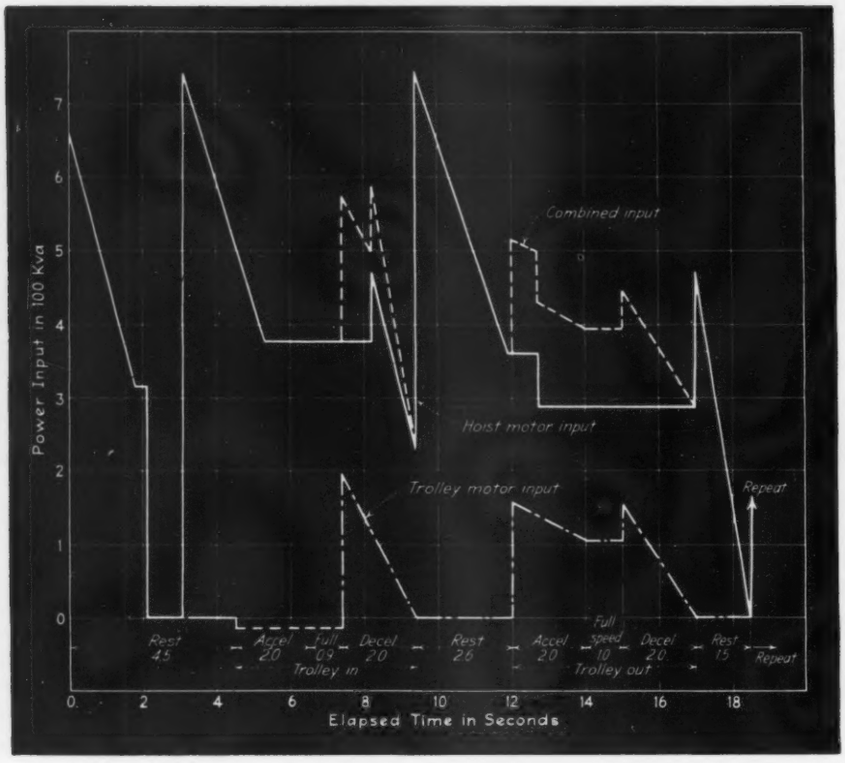


Diagram of power supply to coal-handling system—at peak demands maximum voltage drops are 5.2 per cent on tower buses and 1.7 per cent at substation



Coal unloading cycle at tower

hour when breaking down cargo and averages about 300 tons per hour working through a boat. The main hoist is operated by a 450-hp. slip-ring motor through a single reduction gear drive. The clamshell bucket holds 8,000 lb. of coal and a four-ton counterweight is provided to keep the rush of current during accelera tion within satisfactory limits. One-man control is provided and the operating cycle is completed in 18.5 seconds, the hoisting line speed reaching a maximum of 960 ft. per minute.

Plug, outlet and cable unit for supplying power to traveling hopper

Both the unloading boom and the stacker conveyor boom may be raised, lowered and moved sideways as desired, giving maximum flexibility in use. The stacking boom belt conveyor is maintained close to the coal pile at all times to reduce windage losses.

Coal is delivered directly out of the boat into the receiving piles back of the wharf and the boat and tower are positioned and moved so that each of the three grades of coal go into their respective receiving piles. A boat shipment usually includes more than one grade of coal and sometimes steam and gas coal come in the same cargo.

About 40 per cent of the coal is rehandled to build up the storage piles or make space available in the receiving areas so that a new incoming cargo may be unloaded. This is accomplished by an electrically operated, crawler-mounted, full-revolving crane with a 75-ft. boom and clamshell bucket holding 3,600 lb. of coal, which moves in the space between the receiving and storage piles. Coal is reclaimed from storage by this crawler crane into an electrically propelled traveling hopper operating on tracks. An apron feeder below this hopper delivers coal to a horizontal belt conveyor below which discharges coal upon the inclined conveyors running to the gas plant or to the boiler house.

Coal can be reclaimed from any pile at any time and delivered at a rate of 100 tons per hour to either plant, independent of boat-unloading operations.

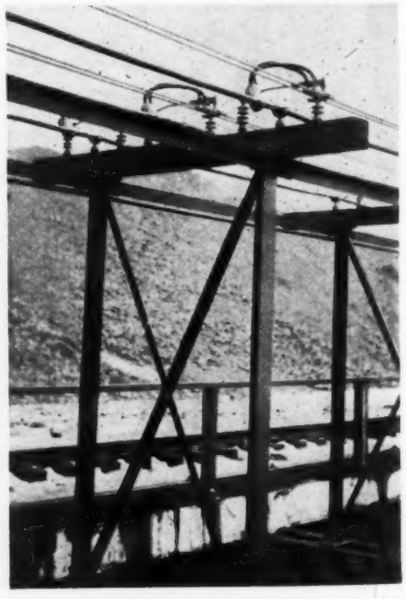
An exhauster is provided for the removal of dust from the crusher house, with its discharge connected to a cyclone collector.

Sampling of incoming coal from a boat is accomplished mechanically by means of a flygate located at the point of discharge of the belt feeder under the receiving hopper of the unloading tower. An automatic timing device insures representative samples which accumulate in a 5-ton storage compartment carried below on the tower structure.

As the coal-reclaiming belt conveyor operating between the storage piles rises at its discharge end in a long radius curve to the crusher tower, a Rawson centrifugal coupling is provided on the drive. the centrifugal clutch effect preventing too rapid an acceleration of the belt which would cause it to lift from the idlers over the curved section of the belt conveyor. The head pulley of this belt includes a magnetic separator to remove tramp iron and drop it into a chute below. Direct current for this separator is supplied from a 5-hp. motor-generator set in the yard substation supplying power to the coal-handling system.

Power for operating the coal-

[*Continued on page 122*]



Trolley feeder, taps and wires for supplying tower

Increasing Capacity Keeps Pace With Rising Demands

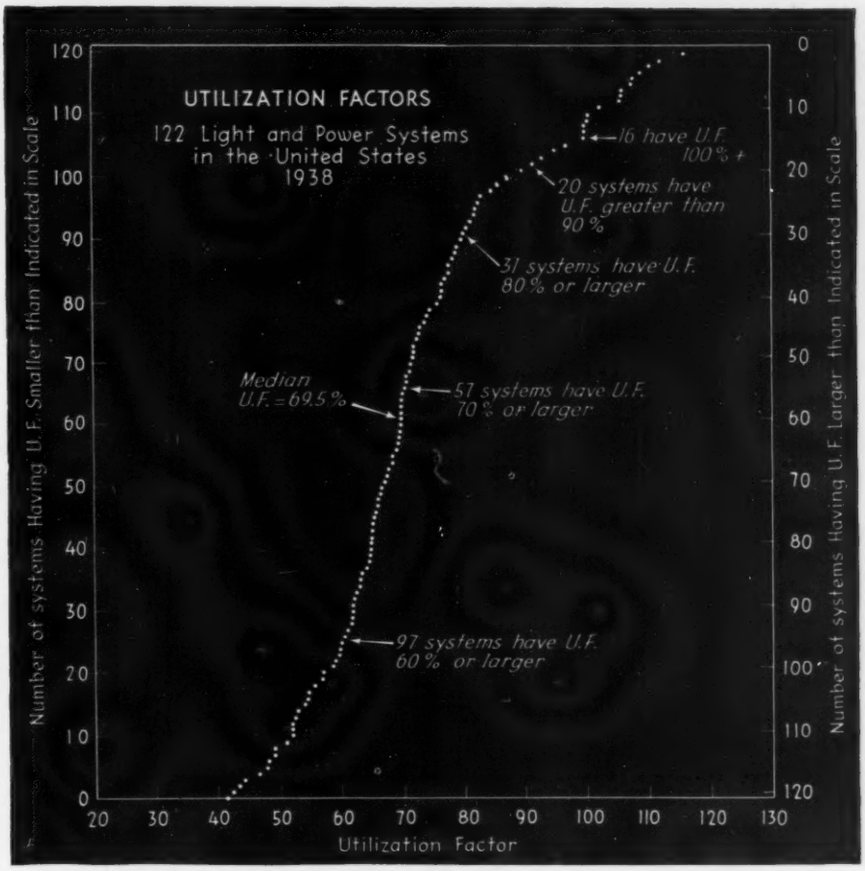
Detailed statistics on 180 major systems for 1938, given in the Supplement accompanying this issue, based on "Electrical World's" 27th annual survey, show ratings above 1937 and generally exceeding peaks by a liberal margin

G. F. WITTIG, *Statistical Editor*

• *With this issue* ELECTRICAL WORLD *presents its Annual Supplement giving statistics on the operation of 180 large public utility systems. The Supplement has been made possible only by the cordial co-operation of executives who kindly supplied the necessary data, and to whom* ELECTRICAL WORLD *gladly expresses its appreciation and thanks.*

SUFFICIENT CAPACITY in excess of peak requirements is a necessary condition to adequate and reliable service. Questions have been raised as to the magnitude of the present margin. Discussion is futile, however, unless facts are available as to the actual power plant capacity and the size of the peaks. These facts are supplied by Table I of the Supplement, in which are listed 180 companies or systems that had an output during 1938 of 100,000,000 kw.-hr. or more.

Of this list 145 are light and power companies in the United States, including several large municipal establishments. Of the others, nineteen are in Canada, one in Mexico and the remaining fifteen are electrically operated railways and railroads.


UTILIZATION FACTORS
122 Light and Power Systems in the United States 1938
16 have U.F. 100% +
20 systems have U.F. greater than 90%
31 systems have U.F. 80% or larger
Median U.F. = 69.5%
57 systems have U.F. 70% or larger
97 systems have U.F. 60% or larger
Number of systems Having U.F. Smaller than Indicated in Scale
Number of systems Having U.F. Larger than Indicated in Scale
Utilization Factor
0 10 20 30 40 50 60 70 80 90 100 110 120
20 30 40 50 60 70 80 90 100 110 120 130

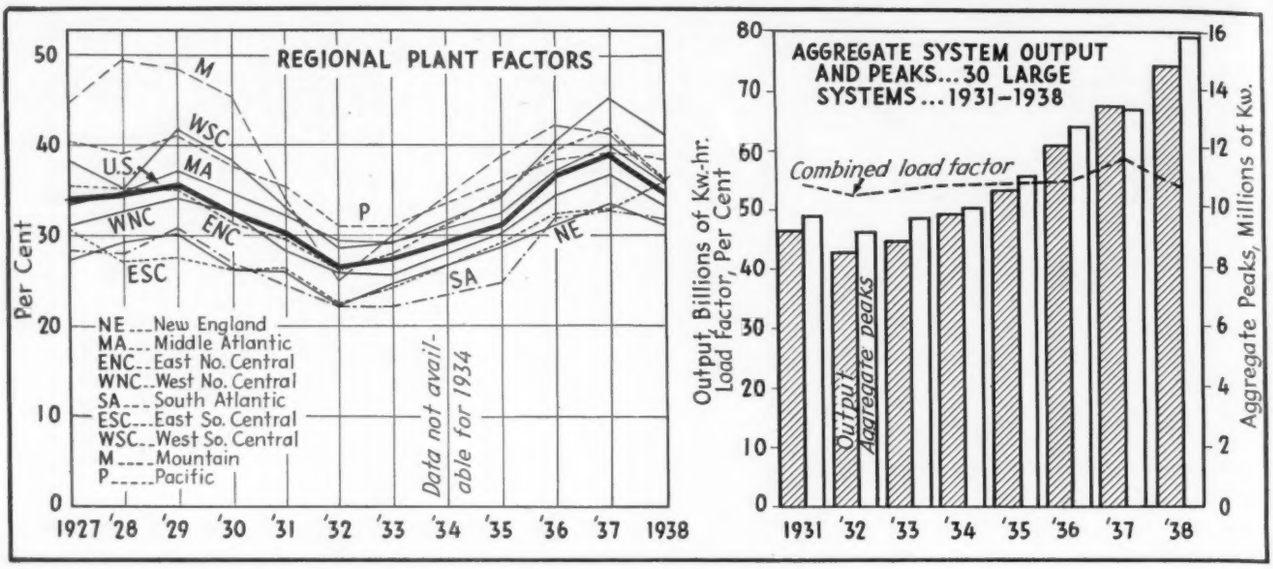
In three-fourths of these 122 systems generator plant peaks were under 80 per cent of rated capacity

Table III—Generator Capacities Grouped by Utilization Factors

Utilization Factor, Per Cent	Number of Systems	Plant Capacity, Kw.
100 and more	16	1,221,954
90 to 99.9..	4	368,256
80 to 89.9..	11	3,053,198
75 to 79.9..	12	3,048,354
70 to 74.9..	14	2,439,567
65 to 69.9..	23	7,118,699
60 to 64.9..	17	8,461,771
50 to 59.9..	16	2,263,952
40 to 49.9..	9	1,188,972
Total...	122	29,164,723

Of the 145 electric light and power systems in the United States 122 supplied data from which the utilization factor (ratio of generator peak to generator capacity) could be computed. The results are plotted in the chart "Utilization Factors." The first point to be noted is that the midpoint is U. F. = 70 per cent, approximately; that is, half the companies had a peak on the generator plants in 1938 that did not exceed 70 per cent of the installed capacity.

Thus, considering the country as a whole, there appears to be a comfortable margin of capacity. No allowance has been made for the fact that peaks are not simultaneous. On the other hand, the country's total capacity could be used only if interconnections were sufficient to enable loads to be shifted at will. While these two considerations tend



With smaller output in 1938, while capacity continued to grow, output per kilowatt was generally less than in 1937. Peaks also were higher, load factors lower

to equalize, it is impossible to define their magnitude. Further, about a third of the capacity is in water power (see insert on Table II of the Supplement); this may not be fully available at the time of the peak. The 70 per cent median does, however, serve as an indicator of nation-wide conditions.

Still Need Additional Capacity

Moreover, comparison with the chart in the ELECTRICAL WORLD of May 7, 1938, page 45, shows that the margin was a little larger in 1938 than in 1937, when the median utilization factor was 72.7 per cent. Apparently new construction fully kept pace with peak requirements in 1938, but provision must be made for ever higher peaks in the years to come.

In Table III the installed capacity has been grouped in terms of utilization factors. More than half is in the range from 60 to 70 per cent. But the conclusion should by no means be drawn that continued growth in capacity can cease. It cannot.

A year ago virtually the identical companies comprised only 26,880,775 kw. The increase of 9 per cent has been approximately absorbed by increased peaks. Also, one-sixth of the capacity is in the groups above 80 per cent utilization factor. Some of the individual establishments are base-load companies. These are expected to carry peaks equal to or even exceeding, for short periods, the rated capacity. Others will probably need to catch up so as to increase their margin, in addition to the retiring of obsolete equipment.

To determine the trend over a longer period the operations of 30 large companies were analyzed. The results from 1931 to 1937 were discussed in ELECTRICAL WORLD of May 7, 1938. These showed an increase from 63 per cent in 1931 to 76 per cent in 1936 and 1937, with a sag in 1932 and 1933. The average for 1938 was 71.3 per cent, which was close to the median of the entire 122 systems in 1938, and indicates that the thirty were a typical sample.

Coverage 92.5 per Cent

Compared with the estimated total of 36,000,000 kw. for the entire industry, the present survey covers 33,359,647 kw., or 92.5 per cent. Systems for which the utilization factor could be computed comprised 29,164,723 kw., or 87.5 per cent of the total in this survey.

From the Supplement it is possi-

Table IV — Output, Aggregate Peaks and Group Load Factors, 30 Companies—1931-1938

Year	System Output Millions of Kw.-Hr.	Aggregate Peaks, Thousands of Kw.	Combined Load Factor, Per Cent
1931	46,989	9,870	54.3
1932	43,036	9,378	52.3
1933	45,435	9,714	53.3
1934	48,785	10,181	54.7
1935	53,019	11,120	54.3
1936	61,371	12,788	54.8
1937	67,089	13,256	57.8
1938	74,596	15,842	53.7

Table V—Changes in Regional Plant Factors 1927-1938 *

Generated Kw.-Hr. ÷ (Plant Kw. × 8,760) Expressed in Per Cent

Region	1938	1937	1936	1935	1933	1932	1931	1930	1929	1928	1927
New England.....	31.0	33.6	31.2	28.7	24.7	22.4	26.0	26.3	30.1	29.2	27.2
Middle Atlantic...	35.5	39.9	37.2	32.6	29.3	29.4	32.3	34.7	37.3	35.0	33.7
E. North Central..	35.9	41.8	39.7	34.7	28.0	26.1	29.6	31.5	35.1	35.3	35.7
W. North Central.	33.0	36.7	34.5	30.2	25.7	25.9	28.6	32.7	34.1	32.8	31.1
South Atlantic (*a*).	31.6	32.9	32.0	24.9	22.2	22.4	24.6	27.0	30.9	28.1	28.5
E. South Central..	36.0	33.8	32.5	28.8	24.2	22.5	26.3	26.1	27.6	27.1	31.2
W. South Central.	41.0	45.2	40.3	34.1	29.1	28.6	33.2	38.6	41.9	35.2	38.5
Mountain.....	35.9	41.4	42.2	38.8	29.9	24.9	34.1	45.5	48.6	49.6	44.6
Pacific.....	38.2	39.3	38.5	36.0	31.1	31.0	35.5	37.8	41.1	39.2	40.6
United States (*a*)	34.5	39.1	37.0	32.5	27.6	26.6	30.3	32.7	35.9	34.3	34.1
Canada (*a*).....	55.8	59.0	57.2	53.2	43.4	42.7	44.4	51.1	61.7	55.2	57.2

* **Column for 1934 is omitted because data from which plant factors could be computed were not collected for that year.**

(*a*) **Omitting Duke Power and Hydro-Electric Power Commission of Ontario, for which detailed data are not available.**

Table VI—Allocation of Output of Major Light and Power Systems, 1929 to 1938*

Class of Service	145 Systems in 1938			146 Systems in 1937			148 Systems in 1936			140 Systems in 1935			144 Systems in 1932			137 Systems in 1929		
	Millions of Kw.-Hr.	Per Cent of Total	Per Cent of Sales	Millions of Kw.-Hr.	Per Cent of Total	Per Cent of Sales	Millions of Kw.-Hr.	Per Cent of Total	Per Cent of Sales	Millions of Kw.-Hr.	Per Cent of Total	Per Cent of Sales	Millions of Kw.-Hr.	Per Cent of Total	Per Cent of Sales	Millions of Kw.-Hr.	Per Cent of Total	Per Cent of Sales
Farm or rural	1,983	1.7	2.4	1,824	1.5	2.1	1,574	1.4	2.0	1,300	1.3	1.9	9,814	11.3	17.0	7,561	8.0	11.3
Domestic	15,681	13.4	18.8	14,405	11.8	16.4	12,879	11.2	16.0	11,221	10.9	16.0						
Commercial retail	14,618	12.5	17.5	13,864	11.3	15.8	12,430	10.8	15.3	10,422	10.1	14.9	9,089	10.4	15.7	9,184	9.7	13.7
Commercial wholesale	41,943	35.9	50.3	48,819	40.0	55.5	44,307	38.6	54.9	38,885	37.8	55.7	29,993	34.6	51.8	41,752	44.1	62.5
Municipal	2,023	1.7	2.4	2,095	1.7	2.4	2,929	2.6	3.6	2,717	2.6	3.9	2,512	2.9	4.3	2,230	2.4	3.3
Other Sales	1,669	1.4	2.0	1,227	1.0	1.4	721	0.6	0.9	296	0.3	0.4	1,231	1.4	2.1	971	1.0	1.5
Railways and railroads	5,491	4.7	6.6	5,684	4.7	6.4	5,912	5.2	7.3	5,008	4.9	7.2	5,234	6.0	9.1	5,149	5.4	7.7
Used by ultimate consumers	83,408	71.3	100.0	87,918	72.0	100.0	80,752	70.4	100.0	69,849	67.9	100.0	57,873	66.6	100.0	66,847	70.6	100.0
Other public utilities	15,840	13.5	.....	16,606	13.6	.....	17,756	15.5	.....	17,832	17.3	.....	15,690	18.0	.....	13,290	14.0	.....
Affil. railway depts.‡	555	0.5	.....	574	0.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Used by companies	1,387	1.2	.....	1,275	1.0	.....	1,177	1.0	.....	983	1.0	.....	953	1.1	.....	1,395	1.5	.....
Losses, etc	15,843	13.5	.....	15,792	12.9	.....	15,063	13.1	.....	14,231	13.8	.....	12,397	14.3	.....	13,199	13.9	.....
Total gen. & purch.†	117,033	100.0	.....	122,165	100.0	.....	114,748	100.0	.....	102,895	100.0	.....	86,913	100.0	.....	94,731	100.0	.....
Company use plus losses in per cent of generated†	.....	16.6	.....	.....	15.7	.....	.....	16.5	.....	.....	17.5	.....	.....	18.7	.....	.....	17.9	.....

* For omitted years see ELECTRICAL WORLD May 5, 1934.
† Excluding company that did not report allocation.
‡ Included in railways and railroads prior to 1937.

ble to compute the load factor (kw.-hr./8,760 divided by peak) for each individual system for the years 1935 to 1938 inclusive. Earlier years are available from previous issues. The trend for thirty major systems, so far as they could be traced, appears in Table IV. While the annual totals are not exactly comparable, because of absorptions and other changes, the changes in "combined load factors" are probably typical.

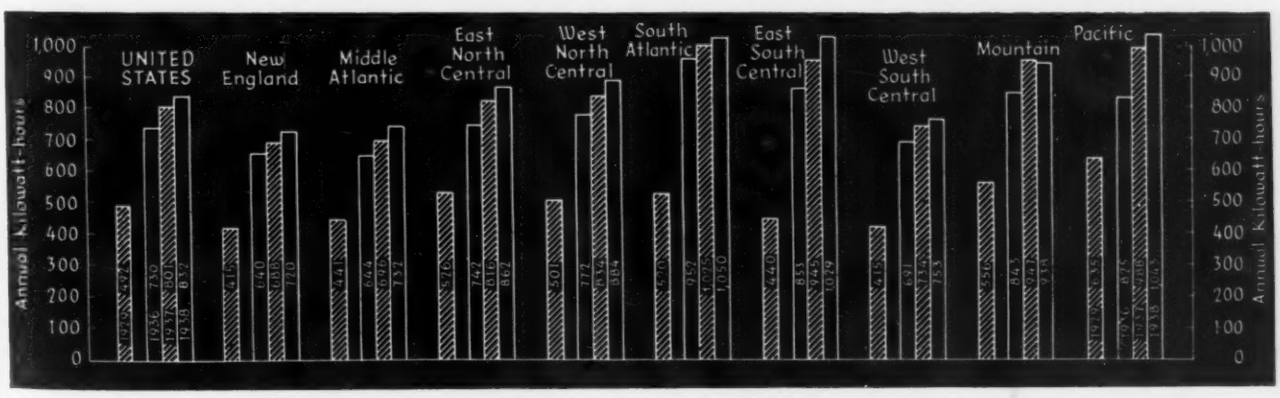
The effect of diminished output during a large portion of 1938 compared with 1937, combined with the rise to all-time peaks in December, is clearly evident in the decrease of the group load factor from 57.8 per cent in 1937 to 53.7 per cent in 1938

Plant factor is another measure of the use of available capacity. Regional averages are given in Table V for a term of years, based on statistics in Tables I and II of the present and earlier Supplements. Here again the decreased output in 1938 is manifested in the generally lower percentages compared with 1937. Long-hour loads for irrigation pumping and for the continuous operation of certain industries on a 24-hour basis bring higher load factors in the regions thus affected. This influence is strongly reflected in the statistics for Canada, where large blocks of energy are absorbed by the pulp-and-paper industry, including the use of electrical energy for boilers.

Table II (Supplement) contains data on the allocation of energy by classes of consumers. These are summarized for the past decade in Table VI.

While other uses—farm or rural, domestic, retail commercial—have trended steadily upward, the consumption for industrial activities has fluctuated widely with changing economic conditions. In 1938, after the sag and recovery during the intervening period, it dropped to the level of 1929.

In contrast, the consumption of energy per domestic customer, shown in chart form for certain years since 1929, and for the omitted years in the chart published a year ago, has nearly doubled in the decade, and in the South Atlantic and East South Central it more than doubled.



Average consumption per domestic customer of large systems has more than doubled since 1929 in some regions; national average increased 69 per cent

Modern Equipment for a Meter Department

Present-day commercial measurement of electricity, much of which is done with special instruments and devices, urges the replacement of unplanned, out-of-date testing equipment with facilities expressly designed for their several purposes

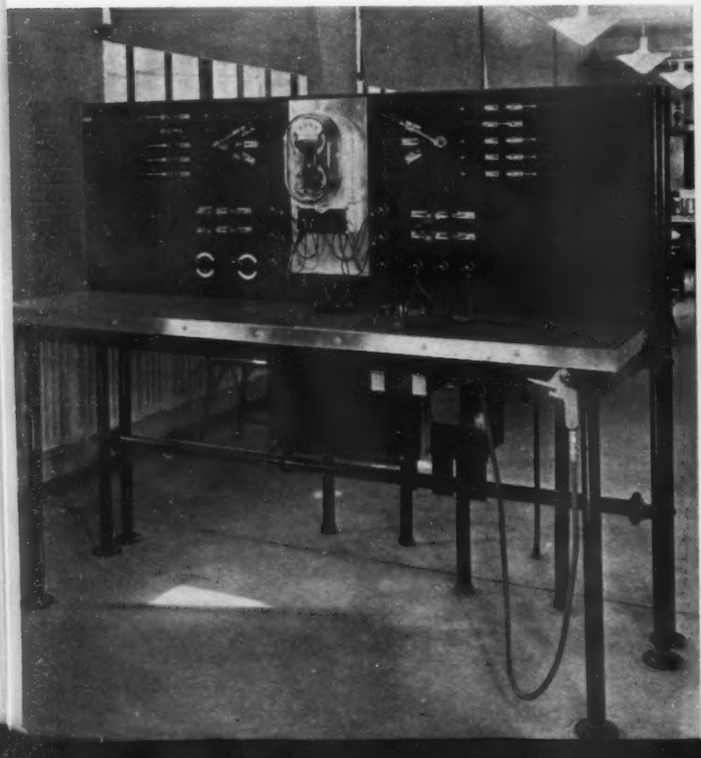
F. E. DAVIS, *Assistant Meter Supervisor, Commonwealth & Southern Corporation, Jackson, Mich.*

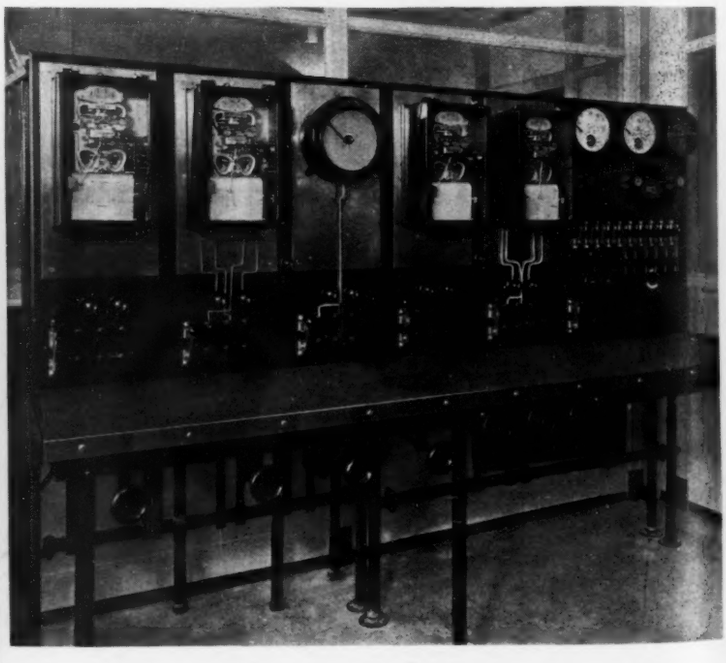
REQUIREMENTS of today, imposed by the growing volume of shop testing resulting from the increasing application of outdoor meters, by the expanding diversity of kind and type of commercial electricity measuring instruments and by the refinements in them continually being developed, demand much more of equipment in the modern meter laboratory than the simple test boards and the heterogeneous collection of wattmeters, voltmeters, etc., that were satisfactory for yesterday. This is true not

Time switch test table
Checks timing and switch action of all types of time switches. Operation of switches in each of the 20 positions recorded by time recorder. Socket type switches merely plugged in.

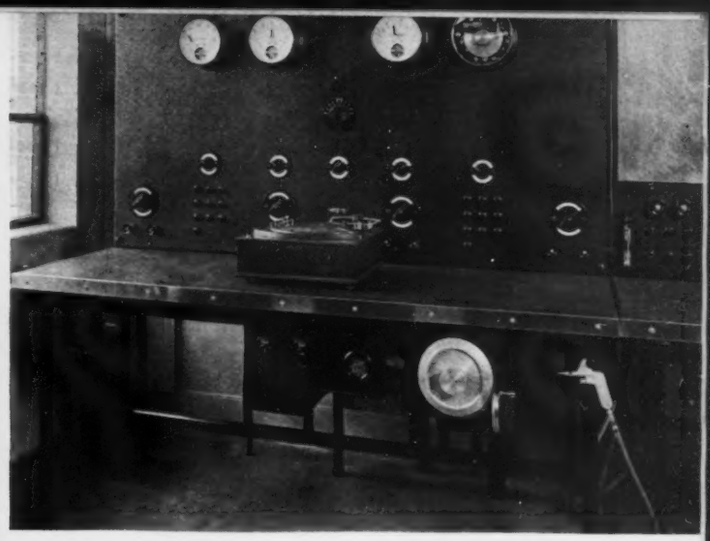
Demand meter test table
Checks operation of all but thermal type demand meters for trial period before acceptance for installation.

Single-position watt-hour meter test table
Primarily intended for polyphase meter testing (both two- and three-element). Switches provided for selecting separate elements or placing them in series.



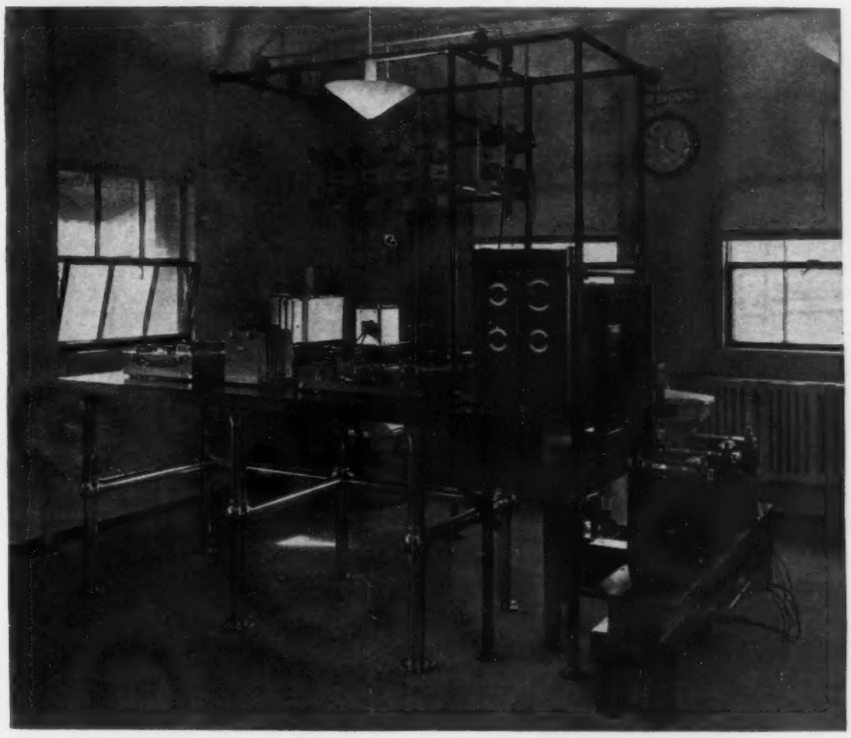


Meter repair table
Stainless steel top. Jars store small repair parts visibly. Insulation testing, equipment integral with table.



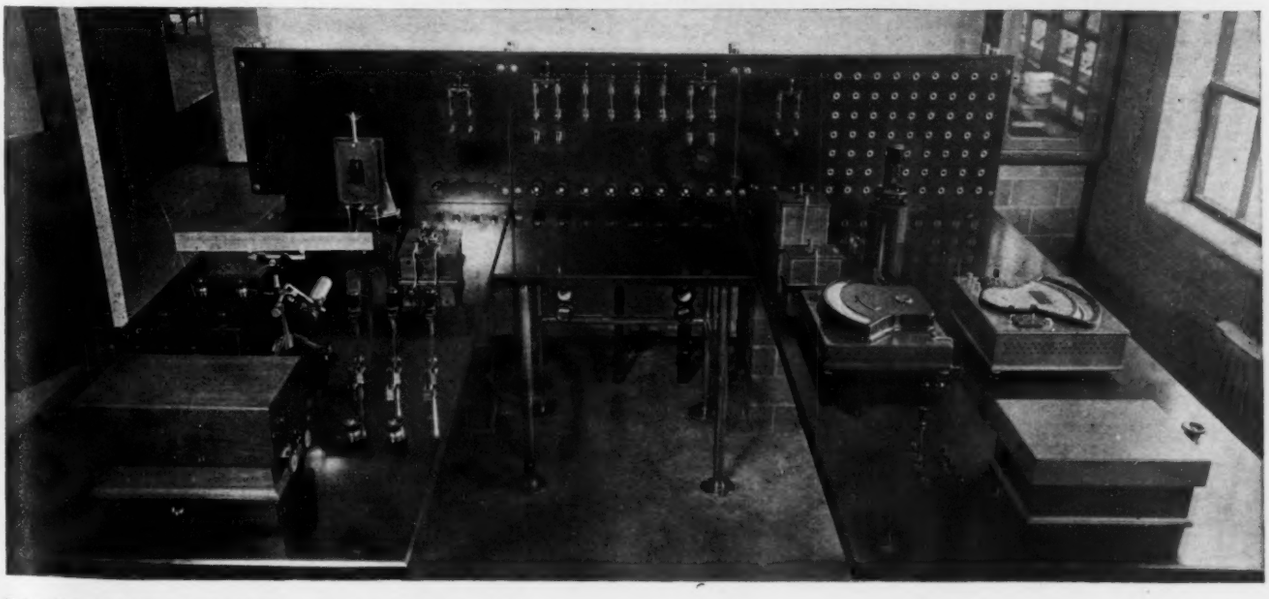
Rotating standard test table
Primarily for calibration of portable test meters, but adaptable to any accurate measurements of watts, watt-hours and power factor. Current ranges ½ to 50 amp. Single rotary selector switch.

only in the operations of large metropolitan utilities, but in smaller ones and in isolated divisions of large area systems as well. An excellent example of a medium-sized utility meter laboratory well provided with useful modern equipment is that of the Springfield Division of the Ohio Edison Company, here pictured.



Instrument transformer test equipment
Complete Silsbee test up to 3,000 amp., and Leeds & Northrup comparative method up to 5,000 volts. Controls conveniently arranged. Test sets mounted semi-permanently for ready removal for field use.

Primary standards corner
These are standards, primary for the laboratory—wattmeter, ammeter, voltmeter, potentiometer, standard cells, galvanometer, bridge, etc.—not primary in the absolute sense.



Editorials

S. B. WILLIAMS, *Editor*

Output Resisting Seasonal Trends

AGAIN attention is called to the weekly curve of kilowatt-hour output. While all other business indices are down, here is a curve that not only is running ahead of last year, but is running neck and neck with, and at times a little ahead of, 1937, the last period of feverish industrial activity.

Normally, the output curve would fall off during the first five months and then start to rise. The curve would seem to indicate a tendency this year to resist the seasonal trend that would have been even more pronounced had it not been for the coal strike.

If the general trend of business is to turn upward before summer, as some statistical services indicate, the utility output will again set up new seasonal records.

The trend of output for the last seven months of 1938 had suggested the possibility that the utility spending this year for new construction and modernization might be the largest since 1931. That it has not is obvious, but it is equally obvious why the spending velocity must improve if and when the output curve shows a definite tendency once more to outstrip previous records.

Demonstration of Service

ELECTRICITY has made tremendous strides in the past fifty years and so has service. At the New York World's Fair, which opened this week, a group of nearly two hundred electric utilities through the Electric Utilities Exhibit Corporation are showing dramatically and practically in an electrified farm and the "Forward March of America" the progress that electricity has made in American life.

Less spectacular, perhaps, but fully as significant, is the demonstration of the policy of the industry—service. Not only has there been made available to the customers of the contributing companies full information about the fair, transportation and living accommodations, but these utilities will act virtually as hosts to their customers to make their visit to the fair pleasant. There will be available a free personalized tour of the fair, an information service and a reservation service.

During the first few days of the first week it became evident that this personalized service was going to make the utility exhibit one of the most popular spots at the 1939 New York World's Fair.

Customer good will is built or destroyed not so much by big things as by little things. This service at the fair for customers is one of those little things that can mean so much to people away from home. It should go a long way toward making people feel when a utility talks about service that it means much more than just the mere furnishing of a commodity, that it means an interest in the customer's welfare, that it means an understanding that comes from an appreciation of human values.

Wanted—A Sample of Electricity

A LITTLE GIRL in New York wants "a little sample of electricity." She is studying about it in geography, she says—and she has the General Electric Company, to which she wrote, stumped. The officials of the company promise to send something "just as soon as they can figure out what it will be."

Who of us that live with and by electricity could suggest what a sample of electricity might be? It couldn't be a motor, or a transformer, or a lamp, or a toaster, or a switch, or a fuse—these are merely pieces of equipment by which electricity becomes useful. It would be possible, of course, to send the little girl a battery—in other words, a package of electricity. But could she see the electricity, even then?

No, we are afraid the little girl is never going to see electricity as she sees other familiar objects about her. All she will ever see will be the effects— or, to paraphrase the Bible, "by its works shall she know it."

But this little girl in her naive simplicity is asking the question that every layman asks, and has been asking ever since electricity became a part of man's daily operations—what is electricity, what does it look like, show me some.

And is it any wonder we have trouble in making people understand what electricity is? We can make it from running water, or from fuel, from differences in temperature as with thermocouples, or from stroking a cat's back. It is both kinetic and static. It is man's greatest tool and nature's most destructive force. It can

heat and it can cool. It can light the insides of one's stomach and send a train across the mountains. It can cook, sweep, wash, run a factory. It can kill and it can cure.

And so, little lady, while you may never get your sample of electricity, everywhere about you it exists. It lights your home and school so you may study. It operates your subway that takes you to school. It runs the elevators that make it possible for people to work in a city like New York. It lights your streets, that you and your parents might be safe outdoors at night. It preserves the freshness of your food through chilling. It runs the machines that make your clothes. It probably washes your clothes and cleans your home.

Maybe you can't see electricity itself, but just think of it as your invisible servant. It is stronger—more powerful, probably, than anything else in the world, but you with your little finger can through a switch make it do your bidding—without any talking back, any sulking, any shirking.

Syndicate Buying by Co-operatives

SYNDICATE purchasing is the latest method being employed by REA to hammer down the cost of rural lines. Orders by co-operatives are pooled and when sufficient for any one manufacturer are in hand in Washington to secure the maximum discount an order is placed with that manufacturer, who in turn makes not one shipment, but as many as there are co-operatives in that pool.

So far it has been confined to watt-hour meters and ground resistance meters, which are purchased by the co-operatives. However, REA is studying methods by which order pooling may be extended to transformers and other electrical equipment purchased by the rural line contractor.

This is not going to be easy to resist, especially if one manufacturer signs up. The volume of business being placed for REA line material is of such size as to make it a strong bargaining weapon. Nevertheless, it must be obvious to any manufacturer that syndicate purchasing does not minimize selling effort. If the co-operative is free to enter its order for any manufacturer's equipment, then selling will be required, but with this difference: When the order was given to the salesman he knew he had it. Now he doesn't know until the pooled orders are placed.

And if, as so often has been the case, syndicate purchasing favors the larger manufacturer, what has been gained except making a present of a lower price to REA co-operatives?

Moreover, if co-operatives can by pooling their orders secure syndicate prices, what is to prevent other buyers from gaining similar advantages?

Certainly REA is not to be criticised for getting lower prices in this way if it can. There has been no secret of the fact that REA going has been getting tougher and that every effort will be made to so reduce costs as to make a better showing.

Under better business conditions it is doubtful if manufacturers would listen to such suggestions, but now there is plenty of manufacturing capacity available. Even so, is the problematical advantage of the moment worth what it might cost in possible future distribution problems?

"Prof"

A MAN of rare kind has left the stage of human events—C. F. Hirshfeld, scientist-engineer. The world needs many such men, yet always has too few of them. They combine the driving curiosity and the inspired imagination of the scientist with the realistic practicality of the engineer.

Mr. Hirshfeld, "Prof" to all who knew him, had an extraordinary mental receptivity for new ideas. Most thinking men examine a new idea from the negative viewpoint. That is, their first reaction is to look for flaws and faults, and, if this examination fails to break down the idea, they then begin to consider its values. But the infrequent men of "Prof's" kind see new things from the opposite viewpoint. They look first for the good in the new idea. Their first reaction is not to consider why the new thing won't work, but immediately to begin figuring on ways to make it work. No one was more willing than "Prof" to search for the kernel of value in what other men would incontinently dismiss as a fool idea. He never let impatience with ignorance or error dominate his reaction to the often extravagant suggestions and propositions brought to him, because he realized that even these might sometimes offer things worth while.

It would be possible to recite a long catalogue of accomplishments to be credited to "Prof" Hirshfeld—research and development in many lines that resulted in great improvements in electric power cable, in steam boilers, in fuel combustion equipment, in street cars and others. He ranged far in thought and interest and the wide scope of his mind made him the acknowledged leader in the search for solutions of the diverse engineering problems of the electric utility industry. But the one thing for which "Prof" will be most greatly missed is that mental quality to which his failures may be traced, the way he warmed up to new ideas. He was never afraid to fail. This is not to say he was reckless in thought and experiment. His profound technical knowledge and remarkable memory prevented that. But he was always ready to think away from the beaten path and to encourage others to do so. For this quality of mind, possessed by so few men, "Prof" will be mourned the most.

SEC Discord

By CARTER FIELD

This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

TO UNDERSTAND the mutterings in the Senate over the nomination of Leon Henderson to the Securities and Exchange Commission it is necessary to realize not only the mess into which the SEC has drifted since William O. Douglas was elevated to the Supreme Court but the personal bitterness and fundamental division as to economic views in the four remaining members of the commission.

Boiled down, the SEC is divided two against two, with George C. Mathews and Robert E. Healy, who happen to be the Republican members, on the conservative side and Jerome N. Frank and Edward C. Eicher, Democrats, on the radical side. Frank is more radical than Eicher, but even Eicher is far from being an old-fashioned Democrat.

With the commission as it stands, action is impossible. Everything results in a tie vote. Any agreement on policy must wait on the appointment of the fifth member, who from then on will always cast the deciding vote.

Corcoran and Cohen

Behind the radical members of the commission. and actually running the SEC, in so far as decisions are possible at all, are the famous brain trusters, Tom Corcoran and Ben Cohen. Thev wrote the act under which the SEC is operating, including the famous "death sentence" for public utility holding companies, and in addition the SEC members know they have the backing of the White House in all things.

Incidentally, the viewpoint of these two men toward the utilities is very different, though it does not seem so when their thoughts are translated into action. Ben Cohen is an honest zealot. The regulation in the public interest which he wants might strangle the privately owned electric companies, but he does not want to kill them. He just wants to carry out his own theories as to what is best for the country. Corcoran, his friends admit, really hates the utilities. But, as has been said, it is sometimes hard to distinguish between a parental chastisement and a murderous assault.

Understanding on Capitol Hill is that the intention of the Administration is to have Jerome N. Frank made chairman of the SEC. As Frank is the most radical of the four present members, and as Henderson would normally be counted on to fall in line with Eicher and Frank to do the bidding of Cohen and Corcoran on all questions affecting the utilities, it is easy to see why the Hopkins "appeasement" program is not producing any fruits meanwhile, despite the purchase of the Tennessee properties at prices higher than most outsiders had ever contemplated—prices "shocking" to the George Norris-John Rankin power bloc on Capitol Hill.

Actually the situation has virtually reached the point where utilities are eager to sell properties, but not willing to buy. Within a few hundred miles of most utilities systems are public projects, or contemplated public projects. They know that the public power advocates are working day and night, and that they not only have a powerful bloc in both Senate and House, but have the active support of the President, of Harold Ickes and of Cohen and Corcoran.

They may have lost the support of Harry Hopkins, but that is only a temporary situation, unfortunately. The statement in ELECTRICAL WORLD two weeks ago of the seriousness of Hopkins' health was so mild that it proved misleading. Actually, Hopkins' friends think he will never really be active again—that his health prohibits his functioning now and will force him to resign before he can become active again.

As a result of this activity of the public power advocates, and of their political effectiveness, there has been a steady infiltration of young men burning with zeal for the public power idea and eager to crusade against the wicked power trust, into SEC, PWA, Federal Power and FCC.

Senators who at the time Hopkins' confirmation was under consideration were sold on the idea that the Administration was going to do everything in its power to bring about a revival of business, so that there would be good times prior to the 1940 election, are appalled at what has been happening since. They shudder at the idea of Jerome Frank being chairman of SEC. They would not like the idea of Henderson, either.

In fact, while the difference of degree here may be hard to explain, it is not exaggerating the situation to say that if the President named the chairman of SEC directly, as he does the chief justice of the U. S., and were nominating Henderson for chairman, the Senate would refuse confirmation. It may, anyhow, unless given some assurance that neither Frank nor Henderson will be chairman.

Chairman's Influence

The logic is a bit strained, for as a matter of fact if Henderson is confirmed—and if he should promptly throw his influence on the radical side, the radical side would be in power no matter who was chairman.

It would be a situation something like what has happened on the House rules committee, though in that instance the joke is on the President. It may be remembered that of all the "purges" last year the only one that succeeded was against Representative John J. O'Connor of New York. His defeat was hailed as more important than all the Administration defeats in the senatorial purges, because, as chairman of the powerful House rules committee, he had blocked several Administration measures, whereas a 100 per cent New Dealer, Adolph Sabath of Illinois, would succeed him if defeated.

O'Connor was beaten and Sabath became chairman, but recently the majority of the committee has lined up behind Representative Cox of Georgia, who has opposed five Ad-

[*Continued on page 125*]

NEWS OF THE WEEK

Engineering Groups Open E.E.I. Meeting in Chicago

See need for system data to permit utilities to guide correctly prediction of effect of various load conditions on adequacy of system capacity — Study reveals shape of class loads

Under today's conditions it is more important than ever that the various units of the industry be thoroughly acquainted with theoretical considerations involved in analyzing the effects of changes in load character occasioned by growth of different classes of utilization on total system capacity, N. E. Funk, Philadelphia Electric Co., declared in addressing utility engineers attending engineering committee meetings of the Edison Electric Institute in Chicago this week.

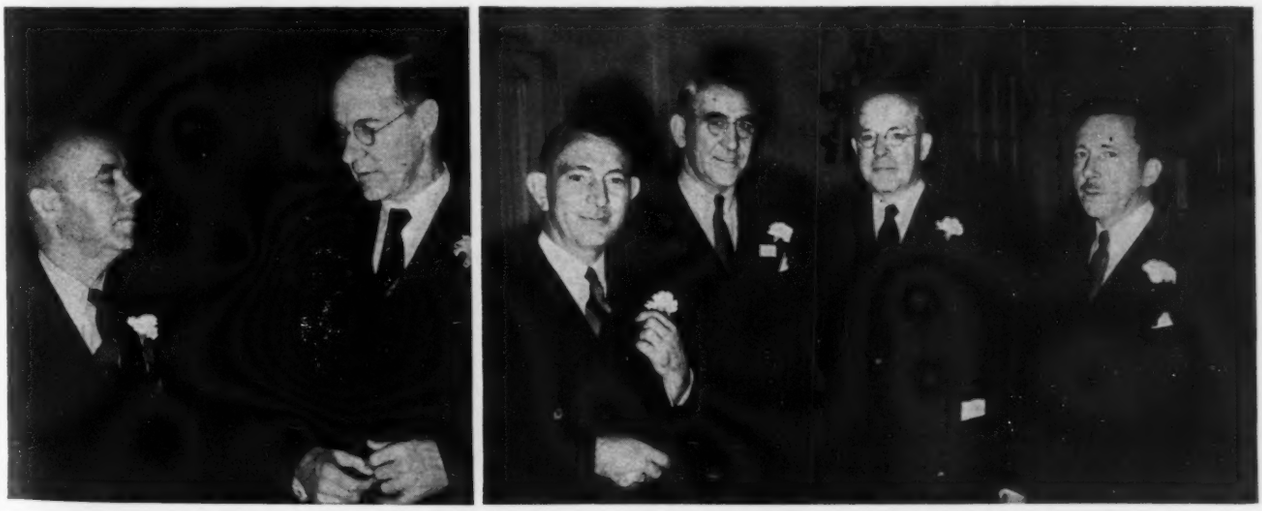
Mr. Funk urged that all available data be assembled on individual systems to permit companies to guide correctly prediction of the possible effect of various load conditions of the adequacy of their system capacity.

Correlating load-factor number of factory shifts per day and "coincidence factor" (defined as the ratio of summated demands of a load class to the sum of individual demands within the class), Mr. Funk showed that the rates of coincident maximum demand of the day of system peak of industrial customers to the sum of their individual maximum yearly demands need not be greater for material increase in industrial operations than under normal conditions.

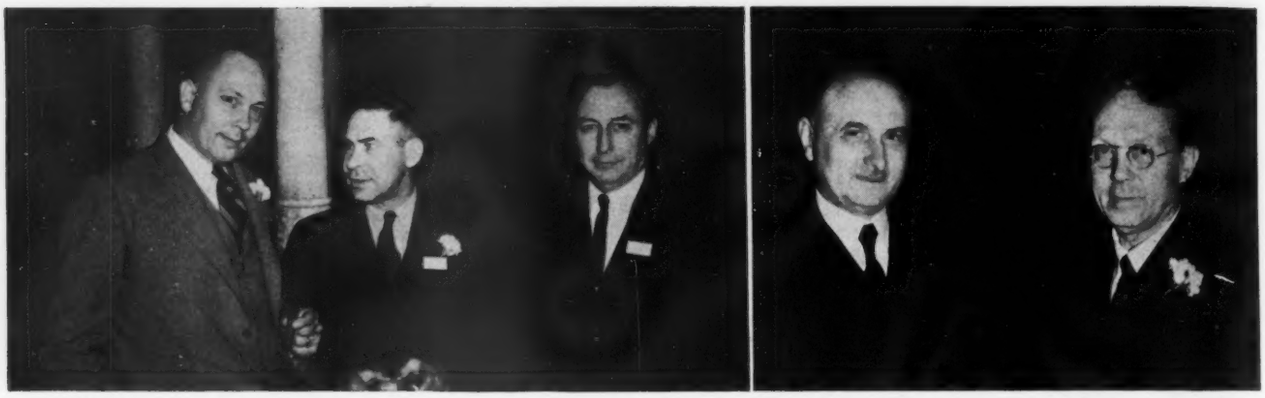
"This condition obtains," he pointed out, "providing the monthly load factor of individual customers under normal conditions exceeds 30 per cent and that during wartime they do not exceed 75 or 85 per cent with increased number of shifts." He further said that should material additions be made to the type of load, but load factor maintained at the normal load factor of the individual customers, then it can be expected that the capacity required will bear the same relation to the capacity now required for industrial load as the added load bears to the existing load.

Mr. Funk pointed out that prior to 1929 predictions of future generating capacity required in any individual system could be quite readily made by relying on characteristics of past performance. Since then there have been no guideposts that can be depended upon with any security.

"The tendency has been," he said, "to consider that improvements in kilowatt-hours per kilowatt of installed capacity were due primarily to an increase in industrial applications and better load factor in general in industry." However, he showed that a segregation of kilowatt-hours per kilo-



ENGINEERS MEET—The engineering committees of the E.E.I. opened their annual sessions in Chicago this week. L. to r.— W. E. Caldwell, Consolidated Edison of New York and chairman of prime movers committee; A. G. Christie, Johns-Hopkins and president of A.S.M.E.; L. W. W. Morrow, McGraw-Hill; A. Gardiner, Okonite Co.; C. C. Baltzly, Philadelphia Electric, and F. P. Fairchild, Public Service Electric & Gas



AT CHICAGO—Attending the E.E.I. engineering committee meetings this week were seen, l. to r.—H. J. Scholz, Commonwealth & Southern; A. K. MacNaughton and A. E. Silver of Ebasco Services; Dean A. A. Potter, Purdue University, and H. M. Cushing, Buffalo Niagara Electric Co.

watt into domestic, small commercial and industrial indicates that the improvement in kilowatt-hours per kilowatt of installed capacity cannot be attributed to larger industrial loads, but rather to change in character of domestic and small commercial.

"It is evidently fallacious, therefore," he said, "to use any method of determining the required increase in national capacity based on national growth of energy generated or energy sold without a detailed study of the class of load in which increased use of energy has occurred, the effect of this increased use on the shape of that particular load class and the effect of the change in the class load shape on system load as a whole."

•

Utility Concession Revoked by Mexico

Revocation of a fifteen-year concession in San Louis Potosi State granted the Compania Hidroelectrica Potosina, subsidiary of Electric Bond & Share Co., forfeiture of the company's $10,000 deposit and reversion of the properties to the government was revealed in a decree published in the official journal last week.

The company obtained the concession in 1928 to utilize the waters of the Naranjos River in Ciudad Del Maiz in the generation of electric power. The concession did not expire until 1943. The company contends it met all legal requirements and has spent more than $200,000 in developing the project.

•

Mail Tax Payments

Checks in the amount of $539,729 for the spring tax payments of Northern Indiana Public Service Co., one of the state's largest taxpayers, have been sent to treasurers in 28 counties.

Utility Employees Win $550 Prize Contest

A total of 28 employees of the Commonwealth Edison Co. representing fourteen different departments last week shared in the $550 prize money of a short paper contest dealing with subjects related to the company's business.

In all 222 papers were received from 201 employees in 25 departments for the five divisions of the contest. The six prizes in each group ranged from $40 for first prize to $5 for sixth prize and were presented by Edward J. Doyle, president.

First prize winners in each of the five divisions were: Financial, William S. Marks, "Budgeting Purchases Through Scientific Forecasting"; Technical, Ludwig F. Lischer, "A New Telemetering Scheme"; Commercial, Arthur P. Larson, "The Stoker Is a Good Load Builder"; Service, Maurice H. Shiffman, "Turning Complaints Into Customer Good Will"; Experienced Writers, Guy E. Trulock, "Load Building Among Tomorrow's Customers."

•

Five PUDs in Washington File Condemnation Suits

The spread of public utility districts in Washington took another step forward when Whatcom County commissioners filed a condemnation suit involving more than $3,000,000 of properties of Puget Sound Power & Light Co. The action was started after the power commissioners had authorized issuance of not to exceed $3,250,000 in revenue bonds.

So far five suits have been filed against Puget Sound Power & Light to condemn property to be taken over by the public utility districts. These include suits by Whatcom, Cowlitz, Lewis, Chelan and Douglas counties. The PUDs have dumped overboard their fiscal agent, Guy C. Myers, Wall Street broker, on the basis that his "negotiations" were not getting desired results.

•

Propose Power Dam on Savannah River

A report recommending the construction of the Clark Hill dam and reservoir on the Savannah River about 25 miles above Augusta, Ga., has been submitted to Congress by Major-Gen. Julian L. Schley, Chief of Engineers. The project, which would cost an estimated $28,000,000, would benefit navigation and provide flood control and hydro-electric power.

A survey of the market for power was completed by the Federal Power Commission some time ago and the project is on the approved list of the National Resources Committee's water resources committee.

Although a detailed design has not yet been made, it is recommended that a concrete gravity dam be built with a maximum height of 150 ft. and length (including an earth dike extension) of 5,100 ft. The spillway would consist of 30 gates 25 x 36 ft. in size, with an additional trash gate. Generating equipment would total 140,000 kw. in four units, with provision for the ultimate installation of one additional unit.

An authorization and appropriation by Congress are necessary before the project can be placed under construction.

•

Permitted to Build Lines

Choptank Co-operative, Inc., has been granted permission by the Maryland Public Service Commission to exercise its franchise granted by its cer-

tificate of incorporation and resolutions passed by the Caroline and Dorchester County commissioners and construct 113 miles of electrical transmission and distribution lines in the two counties.

The authority was granted with the provision that there be no interference with the service of the Eastern Shore Public Service Co. of Maryland at points where the lines cross, parallel or are in close proximity or with lines hereafter erected by the company under authority of the Public Service Commission. Provision is also made that the co-operative shall not serve any customers now being supplied by the Eastern Shore Public Service Co.

•

FPC Postpones Hearing on Niagara Falls Unit

FPC has postponed to June 1 the hearing previously scheduled for May 1 on matters involved in the determination of the actual legitimate original cost, as of March 2, 1921, of the Niagara Falls Power Co.'s project No. 16, one of the first developments granted a federal license following the establishment of the Federal Power Commission in 1920.

The company asked postponement of the hearing to a date three weeks subsequent to the completion of a current proceeding before the commission in connection with the company's application for amendment of the project license to include use of an additional 275 cu.ft. per second of Niagara River waters through the project.

•

Work to Start on Santee Project; Contracts Let

Construction work on the $40,300,000 Santee-Cooper project will start by May 8, Robert M. Cooper, general manager of the South Carolina Public Service Authority, has announced. The Authority has just executed a $4,172,181 contract with the Central Engineering Co. of Davenport, Iowa, and officials of the company announced that they would start work in a few days. In addition, a $138,675 contract was executed with W. C. Sheppard & Co. of Atlanta. Authority members and officials revealed that bids soon will be called on the $6,500,000 Santee or upper basin construction work.

•

Reappoints Morgan to TVA

Dr. Harcourt A. Morgan, chairman of the TVA, has been reappointed by President Roosevelt to a nine-year term as a member of the Authority.

Record Crowd Attends New York World's Fair

Spectacular exhibits at "World of Tomorrow" draws 605,000 attendance on opening day — President Roosevelt sounds keynote — Electrical industry has outstanding exhibits

New York ushered in its World's Fair this week with a first-day crowd of more than 605,000 attendance as President Roosevelt, Gov. Herbert H. Lehman, Mayor Fiorello H. LaGuardia and Fair President Grover A. Whalen sounded the keynote of the "World of Tomorrow."

Dazzling lighting effects, spectacular exhibits and scientific achievements which held the spectators mystified presented a picture which is likely to be long remembered by this generation and others to follow. The progress accomplished and that promised for the future holds new hope for better living.

Electric Utility Exhibit

Amid the panorama of architectural beauty, the electrical industry stands out as among the foremost in the industrial life of the country. Record crowds jammed the exhibits of the electric utility companies, Consolidated Edison Company of New York, Inc., the electrified farm and the ones of Westinghouse Electric & Manufacturing Co., General Electric Co., R.C.A. and the electrical products building. The beauty of the lighting effect caught the eye of the spectators as one of the most magnificent displays yet seen.

It is estimated that upward of 40,000 visited the exhibit of the electric utilities, which is a contribution of 135 companies operating in communities east of the Rocky Mountains. This outstanding display, "Forward March of America," of the progress of electricity and the part it plays in modern life drew much favorable comment. The spectacular and interesting features of the "old" and "new" ways promise to make this one of the impressive exhibits of the fair. As an industry job it is outstanding and promises to be one of the most popular.

The electrified farm had an estimated attendance of more than 20,000. This exhibit illustrates the many ways in which electricity is being employed by the farmer.

Westinghouse reported that capacity crowds jammed the different displays in its exhibit during the opening day. The "S.R.O." sign was out during the entire day, with a great deal of interest shown in the Moto-Man "Elektro," which performs 36 tricks. The giant robot is able to distinguish colors, to talk and to amuse visitors. The "Battle of the Century," a contest between the dish-washing machine and the old way of washing dishes, also drew a record attendance. The battle is performed in the "color" of a regular prizefight with an announcer telling the progress of

OPENS EXHIBIT—Television photograph of Gerard Swope (left), president, and Owen D. Young, chairman, of General Electric Co., as they officially opened the company's spectacular exhibit at the New York World's Fair

FAIR GUIDES—Employee guides and receptionists in Consolidated Edison's "City of Light" exhibit building at the New York World's Fair, 1939, prepare for their duties by visiting the system operator's board at 41st Street, Manhattan.

the contest. A great deal of interest was shown in the Time Capsule, which is buried 50 feet below the surface and is scheduled to remain for 5,000 years. It was stated that spectators asked more than 105 different questions about the exhibit.

Spectacular Displays

General Electric estimated that more than 20,000 attended the "House of Magic" in addition to "S.R.O." in the other part of the exhibit during the day. A great deal of interest was shown in the "House of Magic" and the lightning exhibit. The spectacular displays drew a steady stream of visitors throughout the day. It is one of the most popular at the Fair.

The RCA exhibit, with the latest in television and radio broadcasting and receiving, was outstanding. It was estimated that more than 25,000 visited the exhibit.

Consolidated Edison estimated that more than 42,000 spectators viewed its giant diorama of New York City and saw the many uses to which electricity and gas are put in the home and in industry. The spectacular water fountain and lighting effect drew praise from all those who viewed this exhibit as another step in the progress of the utility industry.

•

Boosts Utility Tax

A measure boosting the gross earnings tax on electric utilities from 1 to 2 per cent has been passed by the lower branch of the Rhode Island General Assembly.

Consolidated Edison Trains Employee Guides for Fair

Consolidated Edison Company of New York, Inc., exhibit building at the New York World's Fair 1939 will be manned by a corps of employee guides and receptionists, Oscar H. Fogg, vice-chairman of the utility, announced this week.

Representing a cross-section of the utility's 37,000 employees, the corps members have just completed a three-weeks' training course covering not only the details of the company's exhibit but also the fundamentals of electric, gas and steam operation in the New York area.

•

Middle West Directors Would Be Paid Salary

Directors of Middle West Corp. will receive a $250 monthly salary instead of a fee for attendance at meetings under a plan promulgated by officers of the company. Stockholders have been notified of the plan, which will be voted on at the annual meeting, May 9. The plan proposes to place all directors who are not paid officers of the company on a salary of $3,000 a year. They now receive a fee of $40 for each meeting they attend.

Middle West is the second major utility to advocate salary compensation for directors since such a system was proposed by former SEC Chairman William O. Douglas last January for all corporations.

Gossler Sees Basis for More Optimism

Philip G. Gossler, chairman of Columbia Gas & Electric Corp., told stockholders last week that "there is basis at the present time for somewhat greater confidence and optimism than was indicated a year ago." Mr. Gossler said that gross revenues of the Columbia system for the first quarter this year showed an increase of 5 per cent over the same 1938 period, while net income available for dividends was up 23.2 per cent.

"I think I may say that while we cannot relax to any extent the closest attention to every detail of our operations," Mr. Gossler said, "it is reasonable to expect continuing satisfactory results during the year."

Mr. Gossler said that out-of-pocket expense in connection with preparation of reports and documents filed with the SEC during and since 1938 by Columbia and its subsidiaries was several hundred thousand dollars, exclusive of salaries of system officers and employees belonging to the regular staff. He said that it was conservatively estimated that more than 141,000 man-hours of time were consumed in the preparation and completion of reports and documents.

•

Frank P. Walsh, Head of Power Authority, Dies

Frank P. Walsh, chairman of the New York State Power Authority and for more than a quarter of a century one of the leading labor lawyers in the country, died, of a heart attack, last Tuesday. Mr. Walsh was stricken on his way from the offices of the Power Authority to the Federal Building, where he was to appear as counsel for Local 3 of the International Brotherhood of Electrical Workers against an application for an injunction by a group of electrical manufacturers on which hearings have been in progress for several months.

Mr. Walsh was chairman of the St. Lawrence Waterway Commission. When the Power Authority was created, he was appointed chairman by President Roosevelt, who was then Governor of New York.

•

Would Honor J. D. Ross

Proposals are being made to the Seattle City Council that the name of the Ruby Dam site be changed to "Ross Dam" as a tribute to the late J. D. Ross, Bonneville Administrator and head of the city's electric system for many years.

King Tells Chamber Of Utility Expansion

If the government adopts a favorable attitude toward the utility business capital expenditures of $1,000,000,000 annually may be expected during the next three years. A statement to this effect was made at the National Resources round-table session of the Chamber of Commerce of the United States this week by L. R. King, president of Iowa-Nebraska Light & Power Co. of Lincoln. He estimated that the utilities would spend about as much in 1939 as in 1938, when capital expenditures totaled $433,000,000.

Defer Expenditures

That May expenditures have been deferred is indicated by the fact that installed capacity increased only from 30,000,000 kw. in 1929 to 36,000,000 kw. in 1938, or 20 per cent, while in the same period production increased 32 per cent. In that connection, he pointed out, the increase in revenue was only 11 per cent, so that production increased three times as much as income.

Mr. King presented a chart and quoted figures showing that the total average use of residential electricity had increased from 428 kw.-hr. per customer per year in 1926 to 850 kw.-hr. in 1938, and indicating that domestic use of electricity had practically doubled in that twelve-year period. He said the average amount received per residential customer in 1926 was $29.87, while in 1938 it was $35.70, an increase of 19 per cent, thus the customer was able to secure double the amount of electricity with only a 19 per cent increase in cost. The amount of electricity the customer used increased five times faster than his bill. The average rate paid in 1926, Mr. King said, was 6.98 cents per kilowatt-hour. In 1938 the average rate paid was 4.2 cents, a reduction of 40 per cent.

Against Utility Taxes

"The business situation surrounding the utility industry", Mr. King stated, "is different from that in most businesses, in that the amount of energy used at present is greater than in the boom year of 1929." In calling attention to the fact that sales taxes should not apply to electricity, as it is not a commodity, he told the story of the school child who wrote in for material for her composition and also asked for a sample of electricity.

As an indication of what the attitude of government should be, Mr. King cited the speech delivered by Governor Heil of Wisconsin at the opening of the New Grandfather Falls plant, in which he stated that his policy would be to give private industry a free hand as long as it is honest, and that the utilities commission must be fair to the industry so that the companies may increase employment opportunities as rapidly as possible.

•

Millar Sails to Attend Illuminating Meetings

Preston S. Millar, president of the Electrical Testing Laboratories and of the United States National Committee

of the International Commission on Illumination, sailed last Saturday on the Cunard liner *Aquitania* for Europe. Mr. Millar will attend the meeting of the British Illuminating Society May 9 in London and will attend on June 12 the meeting in Holland of the International Commission on Illumination.

•

Dismisses Damage Suit

The motion for dismissal of the suit brought by Ben Williams, Jr., trustee of Inland Gas Corp., for triple damages of $52,666,926 and counsel fees of $500,000 against Columbia Gas & Electric Corp. has been granted by U. S. Judge John P. Nields in Wilmington, Del.

•

Output in Belgium Drops

The monthly average output of electric power in Belgium during last year amounted to roundly 439,000,000 kw.-hr., as compared with 462,000,000 kw.-hr. in 1937, a decrease of 5 per cent, according to the Belgian journal *Eclairage et Force Motrice.*

Mange Says Utilities Need More Capital

The utility industry will undertake financing its extensions and meeting power demands when business confidence is restored, J. I. Mange, president of Associated Gas & Electric Co., asserted during hearings before the Securities and Exchange Commission last week.

Mr. Mange stated that earnings of the industry are not sufficient to finance new construction. "The whole industry needs more money in very large amounts to meet the demands of growing territory and of the industry," Mr. Mange said. "Such money cannot be supplied out of earnings, and must be supplied through borrowings and security issues. Money can only be borrowed when business confidence is restored."

The statement of Mr. Mange was made during hearings before the SEC to determine whether the company's $1 par value common and Class A stocks should be suspended or withdrawn from various stock exchanges.

•

Hoffman Appointed Head of Seattle City Light

Eugene R. Hoffman, assistant regional director of PWA, this week was appointed to succeed the late J. D. Ross as superintendent of Seattle City Light. Mr. Hoffman, formerly Seattle park board engineer, also was construction engineer for the Washington State Highway Department. His position with PWA put him in close touch with the City Light program, including Ruby Dam and the Skagit Seattle transmission lines, both financed with federal funds. The Seattle Council confirmation appears assured. Mr. Hoffman's appointment was made by Mayor Arthur Langlie.

•

Canadian Output Rises

Output of central electric stations in March totaled 2,366,532,000 kw.-hr., compared with 2,213,965,000 in February and 2,258,197,000 kw.-hr. in March, 1938, according to the Dominion Bureau of Statistics.

•

Business and "Mr. Jones"

Inadvertently, a mysterious "Mr. Jones" crept into the story "Condenser Bushings Are Longer-Lived," which appeared on page 60 of ELECTRICAL WORLD for April 22, 1939. A. J. A. Peterson, manager circuit breaker division, switchgear engineering department, Westinghouse Electric & Manufacturing Co., should have been credited with the information.

Northwest Utility Group to Hold Meet

Utility accountants of the Pacific Northwest will gather for their fourteenth annual meeting at the New Hotel Vancouver, Vancouver, B. C., May 26-27, under the chairmanship of S. A. Horner, B. C. Electric Railway Co. E. H. Adams, vice-president B. C. Electric Railway Co., will welcome the delegates to Vancouver. Response will be by LeRoy A. Grettum, vice-president and general manager Eastern Oregon Light & Power Co. and president of the association.

Accounting topics to receive consideration at the meeting are: "Original Cost as a Basis for Reclassification of Property Accounts," "Internal Auditing, Credits and Collections," and "Payroll Procedure With Respect to New Regulations as to Wages and Hours."

•

Fall Program Announced by Better Light Bureau

Intensified activities this fall in support of the national Better Light-Better Sight program have been announced by J. E. North of Cleveland, whose election to the chairmanship of the bureau was recently announced. The month of October will be observed as National Better Light-Better Sight Month. All participating groups and industries will join in the observance of the program.

The optical industry, through the Better Vision Institute, will tie in with the activity by observing the last week in September as Better Vision Week, the first time in this organization's history that it has undertaken a national program of this nature. Many utilities are planning to stage Better Light-Better Sight shows or exhibits this fall.

•

Plans "Engineers' Day"

The San Francisco Engineering Council has designated July 13 as "Engineers' Day" at the Golden Gate International Exposition. The entire engineering profession has been invited to attend this commemoration of the engineer's contribution to human welfare.

•

Westinghouse Promotions

Westinghouse Electric & Manufacturing Co. announces that R. B. Mildon, vice-president, formerly in charge of the East Pittsburgh division, moves to Pittsburgh headquarters of the company to assume special sales assignments. The appointment of A. C. Streamer as general manager of the East Pittsburgh division was announced at the same time. Mr. Streamer has been manager of the switchgear division. Mr. Mildon has been associated with Westinghouse since 1906 and has been a vice-president since 1934. Mr. Streamer has been associated with Westinghouse since 1907.

MEETINGS

National Fire Protection Association — Annual meeting, Stevens Hotel, Chicago, Ill., May 8-12. A. R. Small, chairman electrical committee, 207 East Ohio St., Chicago, Ill.

Refrigerating Machinery Association — Annual meeting, The Homestead, Hot Springs, Va., May 11. Association Headquarters, Southern Bldg., Washington, D. C.

Empire State Gas & Electric Association—Electric operating group, Park Central Hotel, New York, N. Y., May 12. George H. Smith, secretary, Grand Central Terminal, New York, N. Y.

Air Conditioning Manufacturers Association—Annual meeting, The Homestead, Hot Springs, Va., May 13. William B. Henderson, executive vice-president, Southern Bldg., Washington, D. C.

National Electrical Manufacturers Association — Spring conference, The Homestead, Hot Springs, Va., May 14-19. W. J. Donald, managing director, 155 East 44th St., New York, N. Y.

National Electrical Wholesalers Association—Annual convention, The Homestead, Hot Springs, Va., May 22-25. E. Donald Tolles, managing director, 165 Broadway, New York, N. Y.

National Association of Purchasing Agents—Annual convention, Fairmont Hotel, San Francisco, May 22-25. G. A. Renard, executive secretary-treasurer, 11 Park Place, N. Y.

Pacific Coast Electrical Association — Annual meeting, Huntington Hotel, Pasadena, Calif., May 24-26.

Northwest Electric Light and Power Association—Accounting and business practice section, Vancouver, B. C., May 26-27. Berkley Snow, secretary, 707 Spalding Bldg., Portland, Ore.

Edison Electric Institute—Annual convention, Waldorf-Astoria Hotel, New York, N. Y., June 6-8. Bernard F. Weadock, managing director, 420 Lexington Ave., New York, N. Y.

Wisconsin Municipal Utilities Association—Annual convention, Plymouth, Wis., June 6-7. J. J. Jedwabny, secretary, Menasha, Wis.

Canadian Electrical Association—Annual meeting, Digby, Nova Scotia, June 21-24. B. C. Fairchild, secretary, 804 Tramways Bldg., Montreal, Que.

International Commission on Illumination—Scheveningen, Holland, June 12-21. U. S. National Committee, A. A. Brainerd, executive secretary, c/o Philadelphia Electric Co., Philadelphia, Pa.

Public Utilities Advertising Association—Annual convention, Belmont Plaza and Waldorf-Astoria Hotels, New York, N. Y., June 18-21.

Society for the Promotion of Engineering Education—Annual meeting, June 19-23, State College, Pa.

Economics Conference for Engineers — Annual meeting, Stevens Engineering Camp, Johnsonburg, N. J., June 24-July 3.

International High-Tension Conference—Bi-annual meeting, Paris, France, June 29-July 8. F. Attwood, president American National Committee, Ohio Brass Co., New York, N. Y.

American Society for Testing Materials—Annual meeting and fifth exhibit of apparatus and instruments. Chafonte-Haddon Hall, Atlantic City, N. J., June 26-30. R. E. Hess, assistant secretary, 260 South Broad St., Philadelphia, Pa.

American Institute of Electrical Engineers—Combined summer and Pacific Coast convention, San Francisco, Calif., June 26-30. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

A.I.E.E. Discusses Insulating Materials

If the new synthetic insulating materials supplant existing materials, particularly in the Class A and Class B groups, it will be because they provide an insulating advantage desirable but impossible with present insulations, rather than on the basis of lower cost or improvement in quality.

This was the philosophy expressed by David M. Jones, central station department, General Electric Co., at a symposium on electrical insulating materials conducted last week by the New York section, A.I.E.E.

Regarding the higher permissible temperatures provided by the new materials, Mr. Jones saw little need for a general raising of design temperature levels, although in special cases, such as traction motors, such an increase would seem valuable. He added, however, that the revision upward was under way in these special fields and would probably ultimately result; general changes, he thought, were not imminent.

•

Extensive Program Planned for A.S.T.M. Annual Meet

More than twenty separate technical sessions have been scheduled for the 1939 annual meeting of the American Society for Testing Materials to be held at Atlantic City, N. J., June 26 to 30. Throughout the week of the meeting there will also be in progress the fifth exhibit of testing apparatus and related equiment, as well as the society's photographic display, which this year is devoted to the theme "Testing and Research in Engineering Materials."

Included on the technical program will be papers telling of new developments in the testing of paints, varnishes, lacquers and related materials; comparison of results in determining solids for 1,200-lb. boilers by electrical conductance and evaporative methods; fatigue tests of wire; a new oscillograph for routine tests of rubber; visual inspection of welded joints.

•

Midwest Power Conference

Copies of the proceedings of the Midwest Power Conference, held in Chicago, April 5-7, are now available at $2 a copy. Request should be directed to Dean L. E. Grinter, Armour Institute of Technology, Chicago. A limited number of the proceedings of last year's conference are also available at the same price.

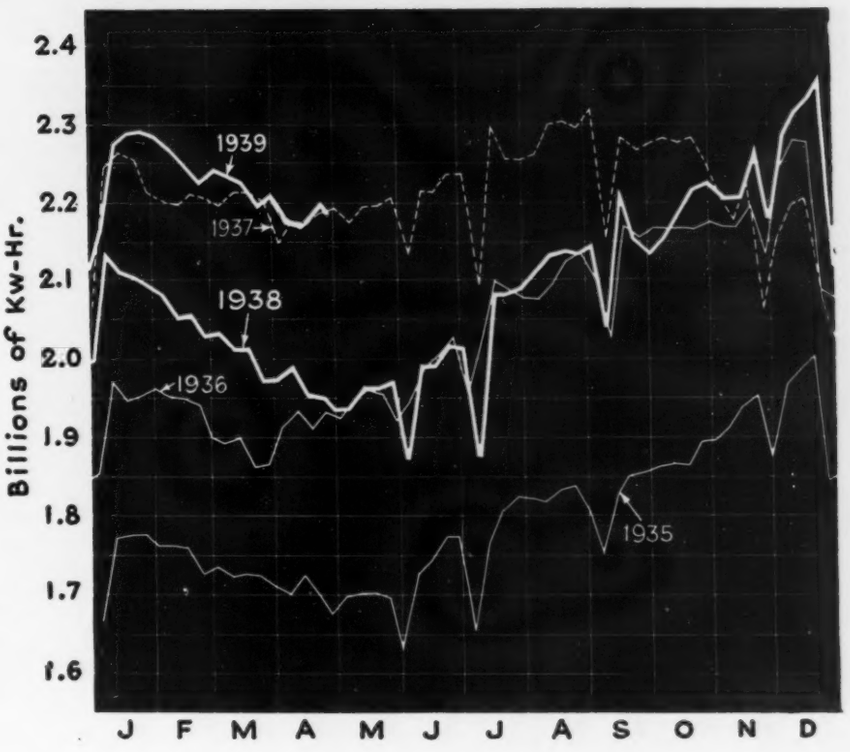
Output Close to 1937—12.6% Above 1938

Still weaving along the 1937 line, the curve of energy production by the electric light and power industry turned moderately downward with a production, in the week ended April 29, of 2,182,727,000 kw.-hr., according to the Edison Electric Institute. This was a decrease of 0.8 per cent from the output of the preceding week, but it was more than in the weeks of April 8 and 15.

The increase of 12.6 per cent over 1938 nearly matched that of the week of April 22, which was the largest thus far recorded. Production two years ago was missed by 0.5 per cent, against an excess of the like amount in the week before.

As to regional gains over 1938, new records for the year appear in the Middle Atlantic, Southern, Mountain and Pacific States and in New England, with the exception of two notably high weeks in early February.

In contrast with strong gains in the Eastern areas a moderate sag appears in the percentages over 1938 in the Central Industrial region.



Weekly Output. Millions Kw.-Hr.

1939	1938	1937
Apr. 29...2,183	Apr. 30...1,939	May 1...2,194
Apr. 22...2,199	Apr. 23...1,951	Apr. 24...2,188
Apr. 15...2,171	Apr. 16...1,958	Apr. 17...2,173
Apr. 8...2,174	Apr. 9...1,990	Apr. 10...2,176
Apr. 1...2,210	Apr. 2...1,979	Apr. 3...2,147
Mar. 11...2,238	Mar. 26...1,975	Mar. 27...2,200

Per Cent Change from Previous Year

Region	Week Ending Apr. 29	Apr. 22	Apr. 15
New England	+15.2	+13.5	+14.5
Middle Atlantic	+14.1	+13.6	+ 8.6
Central Industrial	+12.8	+15.9	+14.0
West Central	+ 1.9	+ 4.1	+ 2.2
Southern States	+ 9.0	+ 8.5	+ 5.9
Rocky Mountain	+15.8	+14.7	+14.2
Pacific	+15.1	+11.8	+11.4
United States	+12.6	+12.7	+10.9

Cities Service Trusteeship Approved by Stockholders

Stockholders of Cities Service Co. approved at the annual meeting a resolution authorizing directors to set up a trusteeship to hold all common stock and an undivided 10 per cent interest in the preferred of Cities Service Power & Light Co., now owned by Cities Service Co. The trustees will collect dividends on the stock and hold all voting rights.

W. Alton Jones, vice-president, told stockholders that there is no assurance that the company will resume preferred dividend payments this year. He said that first quarter earnings were about $1,000,000 below the like period last year, due to depressed oil prices and proration. Utility and natural gas subsidiaries, however, have enjoyed considerably better business, he declared.

•

Combines High Point Suits

Superior Court Judge H. Hoyle Sink plans to devote his full time to hearing litigation over High Point's proposed $6,500,000 hydroelectric project on the Yadkin River. He will ask for a substitute judge to take up his regular duties beginning May 15, while he continues hearings on the project. Judge Sink consolidated two suits against High Point by J. W. McGuinn, a taxpayer, and the Duke Power Co., as intervenor, and the Adams Millis Corp., and fourteen other High Point firms and fifteen citizens.

•

Insulating Varnish Study Is Reported

As a result of laboratory tests extending over an eighteen-year period, Dr. H.P.C. Weber of the Westinghouse research laboratories has concluded that up to 150 deg. C. little damage is done cellulose by oxidation due to air alone, but even slight amounts of acids hasten deterioration.

Dr. Weber detailed the laboratory research in a paper, "Deterioration of Cellulose in Electrical Insulation Applications," presented before the recent symposium on cellulose conducted by the American Chemical Society in Baltimore, Md. Both paper strips and wood sticks were used in the tests, begun in 1921; these strips were impregnated with insulating varnishes, baked and then stored in a sealed glass jar for investigation of the effect of acids formed during the drying of insulation varnishes.

•

Hartford's Mercury Unit 88 per Cent Available

From the operating record of Hartford Electric Light Company's South Meadow generating station for 1938, it appears that the mercury boiler and turbogenerator unit installed there was available for service 88 per cent of the time last year, and that its fuel rate was 10,000 B.t.u. per kilowatt-hour for the period.

The gross electrical energy delivered to the bus from the mercury generator was 47,600,000 kw.-hr. and the net output to the station bus, including the electrical energy and equivalent steam from the unit, was 123,000,000 kw.-hr. On many daily runs during the year the B.t.u. rate dropped to 9,200 or lower. The unit has been continuously operated for the past eight years.

Utility Securities Hold Earlier Levels

50 Bonds
PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
36 Common Stocks
36 Common Stocks
50 Bonds
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10
110 100 90 80
1931 1932 1933 1934 1935 1936 1937 1938 Jan. Feb. Mar. Apr. May June 1939

In a relatively uneventful week of trading, electric utility securities showed little change from previous week's levels. The "Electrical World" stock index held at 28.8; index a year ago, 24.5. The bond index gained slightly and was up 0.3 point to 104.5

Simplified Set-Up Sought by Utility

Stockholders of the Central Indiana Power Co., Indianapolis, were recently told of a plan for the revamping and simplification of the company's set-up. L. B. Schiesz, president, in a letter sent out with the annual report, outlined these proposals.

The plan involves the merger of the Northern Indiana Power Co. into the Central Indiana Power Co. to save taxes and other expenses and simplfy financial structure. Ultimate recapitalization of the Central Indiana Power Co. is planned. This is being held up until the Public Service Co. of Indiana, in which Central Indiana has a common stock interest, can put through a recapitalization plan. The third proposal of the plan is the purchase by Central Indiana of utility property of the Traction Light & Power Co., lying near Northern Indiana Power Co. territory. Negotiations for this are under way.

•

Dividend on Arrears

Directors of the United Corp. authorized a dividend of $1 a share against arrears on the $3 cumulative preference stock. The last payment was 75 cents disbursed on January 18.

•

Preferred Stock Exchanged

At the expiration of the exchange period it was announced by the Consolidated Gas, Electric Light & Power Co. of Baltimore that owners of its $22,306,300 of 5 per cent preferred stock had exchanged 98.3 per cent of the outstanding preferred, share for share, for the new issue of $22,306,300 of 4½ per cent preferred stock. The 5 per cent preferred shares not exchanged was called for redemption on April 26 at $110 per share, plus accrued dividends.

•

Files Amended Plan; SEC Sets Hearings

SEC has announced that it has received an amended application containing a revised plan of reorganization for Mountain States Power Co., a subsidiary of Standard Gas & Electric Co., filed jointly by the preferred-stock holders' committee and the debtor.

The plan provides for the issuance of $8,182,250 principal amount of twenty-year 5 per cent first mortgage bonds, due January 1, 1958; 53,044 shares of 5 per cent cumulative preferred stock, $50 par value, and 249,401 shares of no par common stock, stated value approximately $20.71 per share. A hearing on the amended application has been set for May 16.

The commission has taken action on other utility applications as follows:

Ruled that International Paper & Power Co. and the International Paper Co. are not holding companies within the meaning of Section 2 (a) (7) (A) of the Holding Company Act.

Approved an application by Pennsylvania Investing Corp., a subsidiary of the Associated Gas & Electric Co., for approval of its sale to the Kentucky-Tennessee Light & Power Co., also in the Associated system, of $211,800 of the latter company's first and refunding mortgage bonds, 5 per cent series, due in 1954, for $179,375 in cash.

Set hearing for May 15 in Washington on the application of Niagara Hudson Power Corp. for an order declaring it not to be a subsidiary of the United Corp., a registered holding company.

Ordered that National Light, Heat & Power Co. has ceased to be a holding company.

Announced that a hearing would be held on May 10 on the application of the Utilities Employees Security Co. for approval of the use of current funds for the acquisition of securities of companies which are subsidiaries of or affiliated with the Associated Gas & Electric Co. and the New England Gas & Electric Co.

Set hearing for May 17 on the application of the Potomac Edison Co. for an order by the commission declaring it not to be a holding company.

•

Two Utilities Plan Financing by Notes

Declaration of the American Waterworks & Electric Co., Inc., covering the issue and sale of $8,000,000 of 3 per cent promissory notes to five New York banks, has been made effective by order of the SEC. The agreement under which the funds will be advanced provides that the proceeds will be used, with $250,000 of current funds, to discharge all of the company's outstanding bank loans, totaling $8,250,000. At the present time the company is indebted to the five lending banks in the amount of $6,000,000, which indebtedness becomes due on December 31.

The notes are to be secured by certain collateral, to bear interest at 3 per cent per annum, and to be payable as follows: $160,000 semi-annually from the date of issue and the remaining balance five years from the date of issue.

Montana-Dakota Utilities Co. has applied to the FPC for authority to issue $9,000,000 of first mortgage sinking fund bonds, 4½ per cent, due 1954, and $2,100,000 of unsecured promissory serial notes to be issued to four banks. The notes will mature serially on March 15, 1940 to 1945. Proceeds will be used for redemption of $11.082,000 of the company's outstanding obligations. Hearing has been set for May 10.

Utility Reports

	Net Income 1939	1938
*Boston Edison	$5 453,363	$5,210,544
*Central Illinois Pub. Serv.	1,824,226	1,560,202
*Commonwealth & Southern and subs.	13,300,338	13,484,020
*Connecticut Lt. & Pwr.	3,657,338	3,714,231
*Consolidated Edison N. Y. and subs.	34,797 814	36,570,663
*Long Isand Ltg.	534,190	1,165,542
†Louisville G. & E. (Ky.) and subs.	2,593,173	2,990,602
*North American Co. and subs.	15,952,733	17,014,664
†Oklahoma G. & E. and subs.	2,394,338	2,567,214
*Philadelphia Elec. Co. system	21,898,024	21,517,140
*Rochester G. & E.	3,647,429	4,332,126
†San Diego Cons. G. & E.	1,473,748	1,261,046

*Twelve months ended March 31.
†Twelve months ended February 28.

WHO'S AFRAID of the BIG BAD SHORT CIRCUITS NOW?

IT'S a G-E AIR BREAKER WITH PLENTY OF "I C"

"I C" = Interrupting Capacity

BEWARE OF MAD SHORT CIRCUITS BE SURE OF YOUR "IC"

G-E AIR CIRCUIT BREAKERS have the necessary interrupting capacity to protect your men and equipment. The famous "arc quencher" breaks up the most threatening arcs into countless small bits.

These breakers do more than protect. They minimize production delays. Service can be restored immediately by the turn of a handle. There are no parts to be replaced.

They also provide three-phase interruption.

Wise operators are installing them on all branch circuits where the adequacy of the "I C" is under suspicion. For main circuits, General Electric offers its popular factory-assembled, metal-enclosed switchboard with draw-out-type air breakers.

If you have any question about how to determine the interrupting capacity needed, in order to know the size of circuit breaker to use, get in touch with the nearest G-E office.

THE severity of a short circuit depends largely on the capacity of the transformers that feed the circuits, and it can *not* be determined by the normal load on the circuit. As plant loads have grown, transformer capacities have been materially increased. Therefore, short circuits present an ever-increasing hazard. They gravely endanger personnel and property wherever the power supply has outgrown the interrupting capacity ("I C") of the protective devices. Are you sure of your "I C"? With G-E air circuit breakers of *known* interrupting capacity, you *can* be sure.

G-E AIR CIRCUIT BREAKERS ARE AVAILABLE WITH INTERRUPTING RATINGS UP TO 80,000 AMPERES

GENERAL ELECTRIC

890-81D

890-85

OF INTEREST TO POWER SALESMEN

This is one of a series of G-E advertisements appearing currently in six industrial trade journals to impress upon electrical engineers and maintenance men the importance of having protective devices with adequate interrupting capacity on their main and branch feeders.

OPERATING PRACTICES

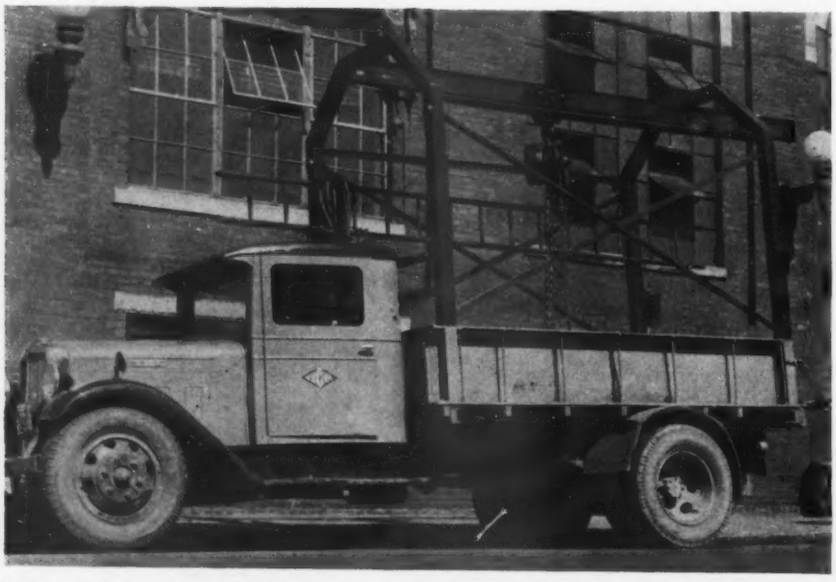
Hoist Truck Handles Transformers Easily

By W. E. BROWN
Manager Electric Department,
Virginia Electric & Power Company, Norfolk

The use of a mechanical mast and crane for handling transformers on a storage platform proved so successful that the idea was extended to a special truck for handling transformers and other similar heavy equipment that required much man-power to load and unload. This was done by taking a standard 1½-ton truck equipped with a standard delivery body and installing on the body an overhead boom supported by a modified H-frame and equipping the overhead boom with a chain hoist similar to the boom and chain hoist previously used in the loading platform.

The same two men who previously handled the transformers on the storage platform after the installation of the overhead crane were now assigned to this truck. The ease and ability of these two men to go to the storage, select the proper transformer and deliver it to the location in the field was amazing in comparison with the time and the amount of man-power formerly required without this special equipment.

If this truck was not available, nor capable of handling other equipment besides transformers, it would not be justified to have a special truck. As soon as the ability of the truck to pick up and handle such things as reels of underground or overhead cable, crossarms, steel parts for special structures on substations and all other such heavy bulky equipment was realized by the different departments it was in constant demand, and it has now reached the point where the work for this truck to do is definitely assigned by the general foreman each day.



Bulky equipment handled by special truck chain hoist convenient in loading and unloading reels and structural parts as well as transformers

Job Plans Show Record of Progress

By WILLIAM E. TENNYSON
Assistant Engineer, Underground and Transmission Construction Department,
Public Service Electric & Gas Company,
Newark, N. J.

A continuous record of the progress of jobs scheduled by the underground and transmission construction department is maintained for ready reference at the Public Service Electric & Gas Company on black and white prints of the job plans by means of a color code with schedule dates in pencil. For conduit work, a field man takes measurements of the width and depth of trench excavated, its location, location and depth of manholes, duct laid, conduit poured, paving replaced, and all other necessary and helpful information. These measurements are plotted on sketches and forwarded to the office each night, to be posted on the progress records the following morning. Excavation is shown by a yellow line, conduit laid by a blue line, backfill by a red line, paving base installed by a green line, and when the permanent paving surface is laid, these lines are cross-hatched in black. The installation of a manhole head and cover is shown by a red circle.

The same system is followed with cable work except for the field man. In this case the supervisor sends in a report of all work performed during the day and this is posted on the progress records the following morning. Each section of cable pulled is colored red and the date shown, each splice made is shown by a solid red circle with the date, and when a transformer is installed it is colored red on the print and the installation date shown.

Power Salesmen, please note. This is what we are telling your customers about our new air-cooled induction regulator. To help you answer questions and make recommendations, we shall be glad to send you a copy of GEA-3057.

A G-E "Regulator" to Give You Better Lighting— Better Motor Performance

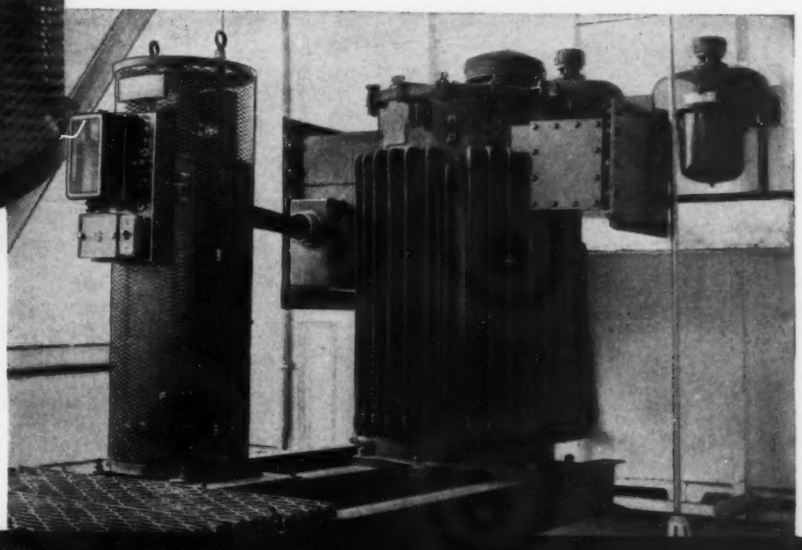
YOU know that voltage delivered at the correct level at your service entrance may fluctuate widely on your plant circuits because of varying power loads and lighting loads. You also know the advantages—in higher efficiency and increased production—of maintaining correct voltage on these circuits.

Now you can do it—economically—with the new G-E air-cooled induction regulators. They operate on the same principle as the larger units used by power companies. They give a smooth, precise voltage regulation that means better lighting, better motor performance, and better service from other electric equipment.

They are easily installed. Because they are air cooled, they require no expensive fireproof vaults. They take little space, and can be placed in out-of-the-way locations, even on beams up near the ceiling.

Find out for yourself how little these regulators cost. Ask your G-E representative for details, or write for Bulletin GEA-3057. Address General Electric, Dept. 6-201, Schenectady, N. Y.

The new line of G-E air-cooled regulators includes regulators for automatic and for hand operation in single-phase ratings from 1.2 kva to 12 kva. For the regulation of lighting and power circuits, 10 per cent raise and 10 per cent lower are provided. The line also includes regulators with 100 per cent raise and 100 per cent lower—for testing purposes and for the control of voltage in industrial processes, such as those using resistance or induction furnaces



This automatic air-cooled regulator, installed next to a Pyranol transformer on an overhead platform, regulates a lighting circuit in a modern factory

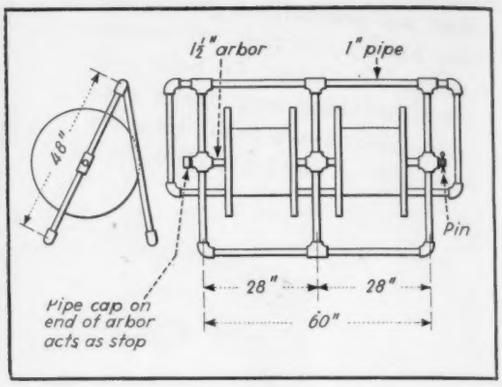
GENERAL ELECTRIC

350-144

The service equipment progress is recorded by notes on the plan beside the building in which the work is being performed, the information being obtained from a report sent in by the job supervisors at the close of each day's work.

With this system, a glance at the print shows that portion of the work complete, that in progress and that not started.

Once a month the percentage complete of each job is calculated from the progress records and checked with the schedule man days and with the cost records. This keeps the jobs well under control at all times.



Inexpensive reel stand speeds stringing operations on rural lines
As shown, it can be used for stringing wire. With sides of stand extended and in one plane reels can be drawn slowly over ground, using one side of stand as drawbar. With sides folded flat it can be mounted on back of line truck in derrick fixtures.

•

Pipe Reel Stand Has Many Uses

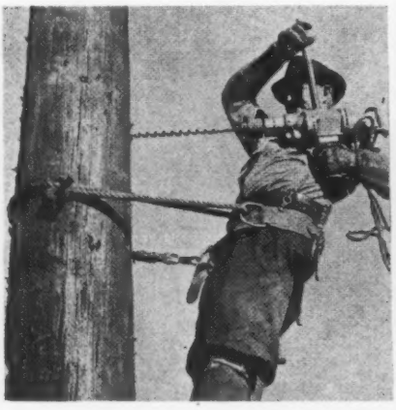
To make easier the handling, moving and supporting of reels in the field during stringing operations on rural lines, Central Illinois Electric & Gas Company, Rockford, Ill., has constructed the illustrated reel stand. This stand is, with the exception of the reel axle, entirely of 1-in. pipe and pipe fittings. It accommodates two reels of wire.

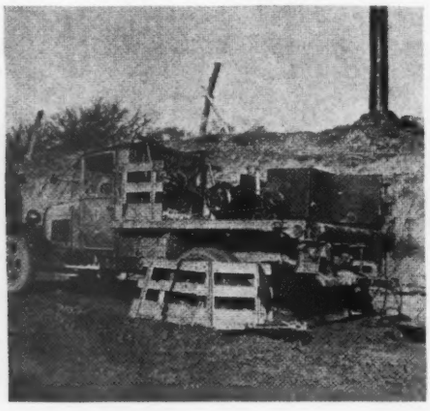
The stand is hinged along its top or ridge so that when the "legs" are spread wide and the arbor removed reels of wire can be easily rolled into position, the arbor inserted and locked with a cotter key and the legs of the stand brought together, raising the reels clear of the ground ready for stringing. Weight of the reels is generally sufficient to keep the reel steady during stringing operations, but if not the stand can be readily guyed or staked down.

With the stand flattened out entirely and one side of the stand used as a "tongue" or "drawbar" attached to a truck the reels can be readily rolled at slow speed over the ground for short distances without removing them from the reel stand.

It has also been found that the stand with the two sides folded together can be mounted on the back of line trucks in the fixtures provided for the pole derrick and held at the top by the winch line so that it hangs out away from the end of the truck. Arranged in this way the stand can be used to run wire rapidly behind a moving truck.

Although stands of different dimensions can be built to accommodate various size reels, the one shown has sides that are 4 ft. 8 in. long by 4 ft. wide. The pipe arbor supporting the reels is 1½-in. pipe. All pipe joints except those where movement is desired (hinges) are brazed.





Boring a hole through a 14-in. diameter yellow pine pole
(Left)—With the usual brace and bit this would be a slow, fatiguing job, but with the equipment shown the four holes are bored with a minimum of effort and time.
(Right)—The equipment shown on the bed of the truck is a gasoline engine driving a small d.c. generator, or, in effect, a miniature portable power plant for generating electric current required for the electric drill.

Power Equipment Bores Crossarm Bolt Holes

By F. S. PARTRIDGE
Construction Superintendent,
Oklahoma Gas & Electric Company,
Oklahoma City

During the heavy sleet storms of last winter considerable difficulty was experienced with some of our single-pole type transmission lines where they run in an east and west direction. It was therefore decided to rebuild the single-pole "Montana" type portion of a 66-kv. line by respacing the conductors and thereby eliminating the possibility of the conductors coming in contact with each other during a sleet storm.

The portion of this line to be rebuilt is approximately 11½ miles in length and the changes necessary to provide sufficient clearance between conductors require four holes through each pole. Hole boring is a major portion of the work involved and it was for this reason that the idea of using an electric drill to bore holes was hit upon.

The small portable generating unit was built by the reclamation department for use primarily in lighting during emergency night work. The d.c. generator was formerly an exciter on an engine-driven generator.

•

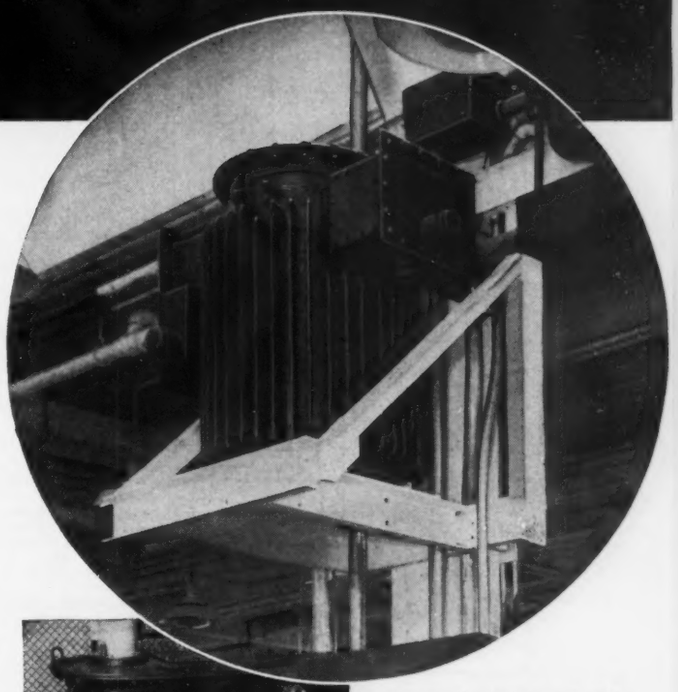
Metering Special Four-Wire Delta Load

For metering special three-phase, four-wire combined light and power services metering standards adopted by the American Gas & Electric Company call for the use of two-element, four-wire delta meters connected, with current transformers, in the

G-E Pyranol Transformers

Offer NEW SOLUTIONS

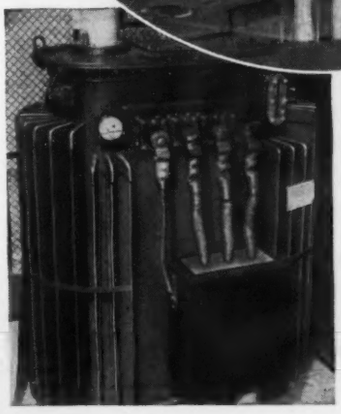
to Many Factory and Commercial Distribution Problems



PROBLEM 1
MODERNIZATION OF FACTORY LIGHTING

In one case, the engineers were asked to increase lighting levels on a factory floor to between 25 and 35 foot candles. The existing lighting circuit, which was 600 feet long, ran from a substation outside the building. To handle the increased lighting load with old methods would have required a new and larger transformer outside the building and new and larger secondary copper inside. Pyranol transformers provided a new solution to this problem that utilized the existing wiring and resulted in savings of 40 per cent.

The old wiring was split into three sections, and a small Pyranol transformer was installed at the center of each section. The expense of running new secondary copper was avoided; voltage regulation was better and power losses lower than they would have been on the long circuit.

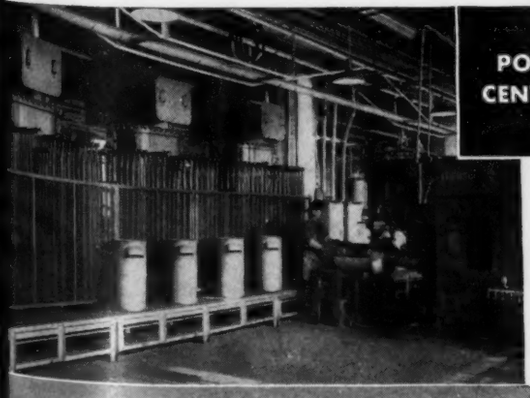


Up near the ceiling, out of the way, is one of the Pyranol transformers that made possible savings of 40 per cent in the cost of modernizing a factory lighting circuit

PROBLEM 2
AIR CONDITIONING IN OFFICE BUILDINGS

The installation of air-conditioning equipment in buildings frequently presents a problem in power distribution that can be answered economically by Pyranol transformers. The Pyranol transformer shown at the right is installed on the third floor of the Equitable Building in Des Moines, Iowa, to supply an air-conditioning load on that floor. Because Pyranol is noninflammable, the transformer could be installed without a vault, at a convenient location near the load center.

Greater safety, plus savings in the over-all cost of transformer installations, makes Pyranol transformers the most practical and economical transformers for office buildings, theatres, hospitals, and other public buildings



PROBLEM 3
POWER FOR CONCENTRATED FACTORY LOAD

Welding machines in the Pittsfield Works of General Electric required power at 575 volts. Floor space was at a premium, and this fact made it impracticable to build a fireproof vault near the load center and install oil-filled transformers. Pyranol transformers—three of them, each rated 635 kva, 13,800 v—provided the answer and reduced the over-all costs of the installation.

For your installations, it will pay you to investigate the possibility of savings with Pyranol transformers. Ask your G-E representative for complete information, or write for Bulletin GEA-2637. Address General Electric, Dept. 6—201, Schenectady, N. Y.

GENERAL ELECTRIC

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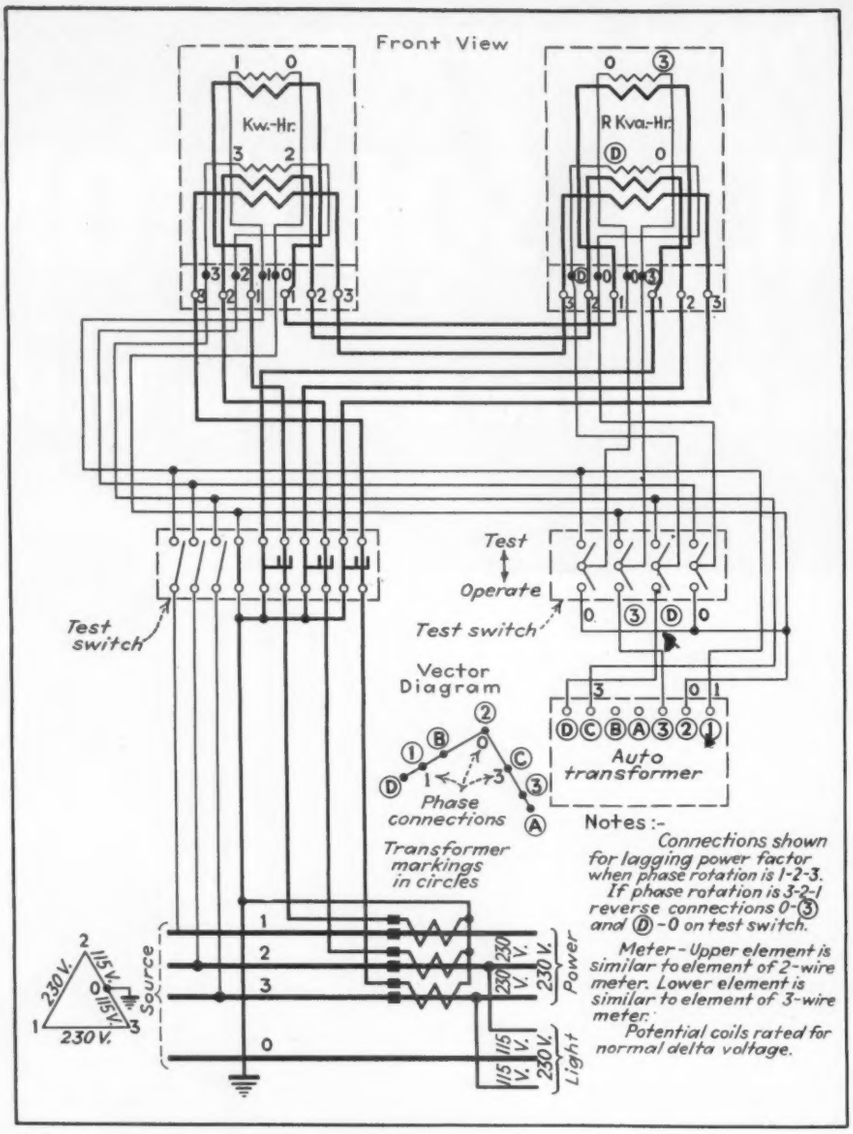
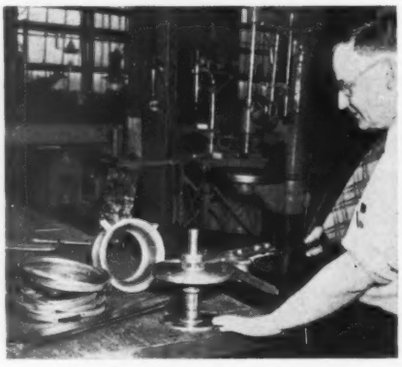


Method of connecting special two-element meters for metering three-phase, four-wire, delta loads

manner indicated. This arrangement with the modified two-element meters used is relatively less expensive than the three-element meter. Means are also provided for determining average power factor by measuring reactive-volt-ampere-hours with the same type of meter and a standard reactive-auto-transformer. The three-phase, four-wire delta type of service is used by the company only for special cases and then only when the lighting load is incidental to the power load.

Test switches on the reactive meter allow it to be disconnected from the auto-transformer and connected in the circuit for test as a watt-hour meter. Facilities are also provided on the other test switch for short circuiting the secondary of the current transformer when not connected in the meter circuit.

Machine Makes Lamp Bowl Bands



Ingenious minds of workers in the Buffalo Niagara Electric Corporation evolved this hand machine which bends strip steel to form bands for diffusion bowls of street lights. Zinc from old meter boxes is used in galvanizing a great many of these bands also—another time and money saver.

What Are Old Meters Worth?

By HAROLD H. BROWN
Iowa Electric Light & Power Company, Cedar Rapids, Iowa*

Suppose that a meter has been removed from service for some cause, possibly repair. Under certain circumstances such a meter in good condition is as valuable as a new one. If a new meter must be bought in case it isn't repaired, if the repaired meter can be used on a consumer with a low demand and consumption, the service it will render is nearly that from a new one. It is nearly correct to consider that a meter has a normal life of about 30 years. It is more conservative not to assign any value to it beyond that age. Therefore the value of an old meter which has been put in good condition is only about 3⅓ per cent of the value of a new meter for each year of life it has remaining before it reaches 30 years of age.

If, on the other hand, the number of consumers which can be accurately metered by the older type of meter is limited and a program of outdoor metering is in progress it is not a question of buying a new meter to replace the old one. The old meter if repaired will necessarily be used out of doors or substituted for one which will be. In this case, in addition to the cost of repair there is the cost of an outdoor housing. This total cost must then be compared with the cost of an outdoor meter and its mountings. The cost of an outdoor meter housing and test block will probably be about $3 more than the cost of the socket or connection box and block used with the outdoor meter. Even after housing this meter it is still an old meter with comparatively few years of life and should be valued as previously stated at about 3⅓ per cent per year of remaining life. This valuation is still dependent upon finding a consumer with a low demand. If this can be done there will still be the loss of registration caused by lack of temperature compensation. If there is any major repair expense or if an outdoor meter program is in progress there is very little chance profitably to repair a meter twenty years of age or older.

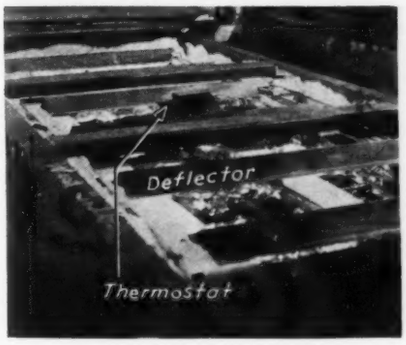
*Adapted from paper to Iowa State College Electric Meter Conference.

INDUSTRIAL ENGINEERING

Hot Plate Reduces Rejects on Press

By K. M. BANTHIN
Oak Park, Ill.

Performance records of an alloy sheet-forming press in a Midwest metal-working mill showed that the percentage of rejects was lower during summer months than during the winter period. On investigation it



Hot table saves $2.40 per shift by assuring delivery of sheets to forming press at uniform temperatures

Picture shows general layout of table, aluminum foil insulation, sheet steel deflectors over five 1,000-watt strip heaters and center mounted thermostat bulb in contact with top sheet

was found that the metal was stored in a practically unheated warehouse and was delivered to the press at a temperature proportional to the seasonal variations. Then study established the fact that a minimum of imperfect units resulted when sheets were pressed at a surface temperature of 80 to 85 deg. F. An electrically heated and controlled hot table was installed to insure delivery of sheets to the press at the proper temperatures. A 15 per cent decrease in rejects resulted. This effected a net saving of $2.40 per eight-hour shift.

The hot table was constructed at the conveyor line. This table consisted of a 4-ft. x 7-ft. 6-in. top sheet of ¼-in. mild steel, a 10-in. depth box of No 14 gauge steel and five 1,000-watt strip heaters mounted at equal spacings on a transite strip located 4 in. off the bottom. As the principal heat transfer was by radiation a double layer of wrinkled 0.00032-in. aluminum foil was used on the sides and bottom. To prevent excessive localized heating immediately over the strip heaters No. 20 gauge sheet steel deflectors were placed over them. Uniformity of desired temperature on the top plate was secured by a variable gas bulb thermostat with a variable range of 220-290 degrees F.

In the operating sequence, the sheet of alloy metal was conveyed onto the hot table and thence manually moved to and manipulated in the forming press. Uniform metal temperature was obtained by compilation of a conversion table taking into account the following variables: (1) Gauge of sheets; (2) variety of alloy; (3) temperature of storage room; (4) speed of press for particular dies; (5) number of passes required in press; (6) thermostat setting of hot plate.

During a short period of time the operators became very efficient in the control of sheet temperatures. After a five-month period of observation covering a wide variety of operating conditions a decrease of 15 per cent in rejections was obtained.

Cost of unit:

Fabricated steel table including installation	$40.00
Thermostat	12.00
Five strip heaters	11.25
Aluminum foil	2.80
Transite strips	2.45
Electrical wiring and safety disconnects.	16.00
Total	$84.00
Operating cost, per eight-hour shift (average)	$ 0.80
Savings, per eight-hour shift of average production	3.20
Net savings per eight-hour shift	2.40

•

Selecting Heaters for Electric Ovens

By J. C. HARRIS, JR.
Consolidated Gas, Electric Light & Power Company of Baltimore*

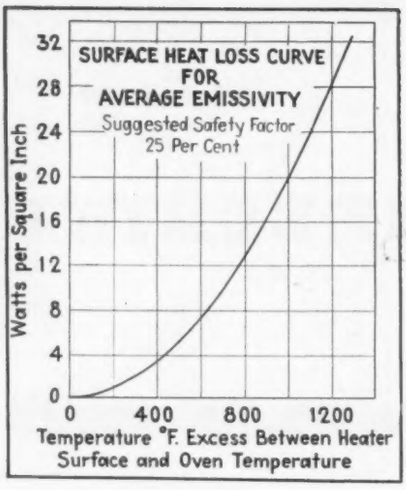
In general, if non-corrosive liquids are to be heated in an oven or kettle a "dip" or immersion type heater should be used. If solids are to be heated—conductively—a strip or spot type of heater should be chosen. Air is the heat-transferring medium in oven heating and it may often

* Based on a paper submitted in the recent General Electric industrial heating contest.

Comparative First Costs of Various Types of Electric Heaters for Ovens

Kw.	Present Users' Price				
	Calrod Heaters	Strip Heaters		Oven Heaters	
		Low Temp.	High Temp.	Low Temp.	High Temp.
1	$9.80	$3.25	$4.40	$11.30	$22.00
3	24.99	9.75	10.00	14.75	26.25
5	41.65	16.25	14.40	16.50	28.00
10	83.30	26.63	29.24	33.00	56.00
20	166.60	57.26	58.48	66.00	100.80
50	367.50	138.13	140.25	154.50	252.00

Certain conclusions may be drawn:
(1) Calrod units are to be used only for special oven applications.
(2) Below 5 kw. capacity strip heaters probably will be the lowest in cost for low temperature oven heating.
(3) Above 5 kw. capacity for low temperature oven heating the cost of application and other considerations should determine the selection between strip and oven heaters.
(4) High-temperature oven heaters should be used for temperatures between 950 and 1,150 deg. F.



Curve of surface heat loss

be advisable to use air as the medium in kettle heating, in which case more or less the same questions are involved.

After the quantity of heat has been calculated, one of three general types of heaters may be selected for an oven: Strip, tubular (Calrod units) or ribbon-wound heaters. Before any selection of equipment can be made, however, proper heat distribution must be secured, since this may dictate the type of heater to be used. Inexpensive baffling, such as oven shelves, or ducts, to carry the heat by natural convection, will often answer this question.

The watts allowable per square inch of heating surface, next to be considered, may be found by use of the above curve prepared from various data and formulas; credit should be given to "Industrial Electric Heating" by Stansel and to curves prepared by Johns-Manville.

For example, if the oven is to operate at 350 deg. F. and 750 deg. F. is the maximum allowable temperature of the heater, then one of less than 3.2 (less 25 per cent) watts per square inch must be selected; if 1,200 deg. F. is the maximum allowable temperature in a 350 deg. F. oven, then a heater of less than 13.2 (again less 25 per cent) watts per square inch should be chosen.

Comparable data on first cost of the heaters is given in an accompanying table. In making the tables the fact that such factors as size and shape may dictate the selection of equipment have been disregarded.

It remains to find out the installation cost of strip and oven heaters. Knowing the equipment cost and the installation cost of each type, the various advantages of each type can be compared with the disadvantages in cost, operation and maintenance and the final decision be made.

•

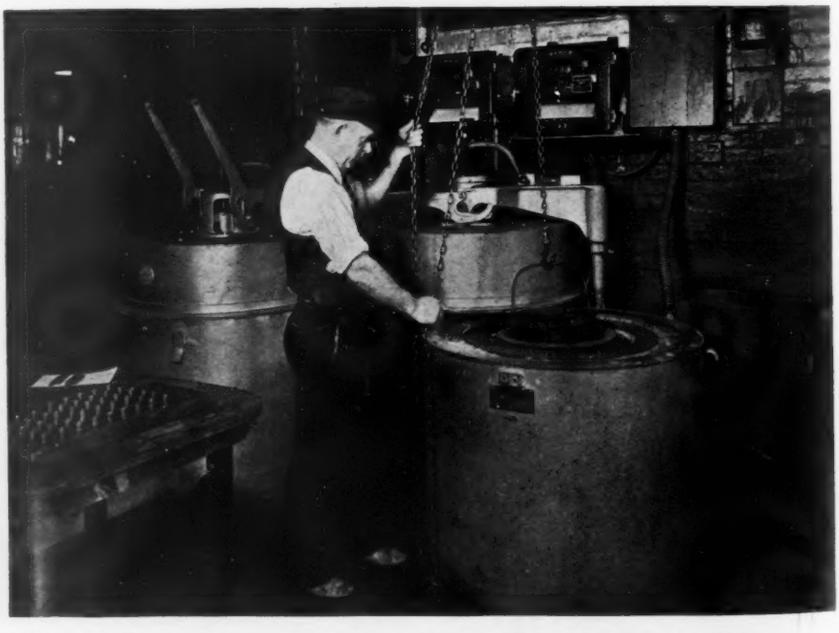
Electric Furnaces Give Uniform Heat

Production efficiency has been increased in tempering screws, bolts, cutters and small tools by the use of electric air drawing furnaces at the Pratt & Whitney division of Niles-Bement-Pond in Hartford, Conn. Several years ago a 45-kw. General Electric furnace (at left below) was installed, and the results were so satisfactory that a second unit of the same make and rating has lately been purchased (right). Carbon and high-speed steel and tools are tempered, ordinarily about two hours being required, with operating temperatures ranging between 500 and 1,200 deg. F., according to the work. Leeds & Northrup "Micromax" control is provided.

In small work of this kind, which packs closely, forced draft provided by an electric fan insures uniform and rapid distribution of heat on a better basis than former horizontal type furnaces permitted. The furnace chamber is 22 in. in diameter by 26 in. deep and the control provides a permanent record of temperature and time relations. Repeated production of uniform quality results.

Effective Power Bank Switching Arrangement

Space under the 8-ft. platform supporting 4,000/440-volt, three-phase power transformer banks at the Caterpillar Tractor Company plant, Peoria, Ill., is effectively used for all metal weatherproof switch houses controlling the 440-volt, three-phase circuits used in the plant. This transformer installation at the foundry consists of three 333-kva. and three 200-kva. transformers supplying power and one 200-kva. unit supplying light. Several similarly arranged banks supply each plant building. All banks are located outside the building wall as near the load center as possible.



Electric air drawing furnaces increase production efficiency at aircraft plant

Not so difficult in New Homes

but —

Selling ADEQUATE WIRING in OLD HOMES is A BIG JOB!

Let the FUSTAT help you do it!

Adequate wiring means — **more circuits installed**

The Fustat prevents permanent overloading of the circuit. Once the correct size has been installed it cannot be replaced with a larger size and bridging it in any way is virtually impossible. If additional circuits are needed the user cannot sidestep the issue at the sacrifice of safety.

Adequate wiring means — **more satisfactory operation of appliances**

The Fustat prevents low voltage conditions that so frequently cause dissatisfaction with toasters, percolators and other appliances — because the Fustat keeps users from loading circuit beyond the proper capacity of the copper.

Adequate wiring means — **more outlets per circuit**

The Fustat permits adding a maximum number of outlets to the circuit. Its long time-lag keeps it from blowing needlessly on motor-starting currents — yet it prevents the wiring from being loaded beyond the capacity of the Fustat. Hence, adding any number of extra outlets is a perfectly safe practice.

Adequate wiring means — **more appliances in use**

The Fustat permits adding more appliances to a circuit. It doesn't blow on motor-starting currents or other harmless overloads. The circuit can be loaded to approved capacity without needless blows — and without sacrifice of safety.

Adequate wiring means — **more consumer good will**

The Fustat helps sell the electrical way of doing things — for it generally permits users to add new appliances without being annoyed by needless blows . . . it assures proper operation of appliances because low-voltage cannot be caused by overloading . . . it reduces chances of users being frightened by shorted cords burning up, for the quick action of the Fustat on dangerous cord shorts — prevents spraying of metal, starting of fires, burning of users . . . it helps teach user that the protective device is a desirable safeguard instead of a nuisance . . . thus it assists the whole industry to build towards bigger business and better times.

The Fustat helps bring Adequate Wiring more quickly — so it's just good business to sell, install and use Fustats

WHAT IS THE FUSTAT?

It is a fuse to which a thermal cutout is added.

It protects like a fuse against short-circuits — even high resistance shorts such as occur in flexible cords.

It protects against permanent overloads, even when as light as 25%.

Retails at 7½c

Yet it will not blow on motor starting currents of washing machines or other appliances.

It has a base that guards against anyone robbing the circuit of protection.

It fits Edison base fuseholders through the use of an inexpensive adapter.

The FUSTAT

For full information write to any of these firms

BUSSMANN MFG. CO., University at Jefferson, St. Louis, Mo.
JEFFERSON ELECTRIC COMPANY, Bellwood, Ill.
KIRKMAN ENGINEERING CORP., 121 Sixth Ave., New York City
NATIONAL ELECTRIC PRODUCTS CORP., Fulton Bldg., Pittsburgh, Pa.
UNION INSULATING CO., 27 Park Place, New York City

Retails at 7½c
in 15 to 30 amp. sizes

NEW ENGINEERING IDEAS

Spinner Check on Commutators

By K. H. MEYER
Methods Engineer
Reliance Electric & Engineering Company,
Cleveland, Ohio

It is quite important that commutators for high-speed motors be thoroughly "aged" before their final assembly on armatures. To expedite this "seasoning" process the Reliance

Centrifugal test for commutators

Electric & Engineering Company in its Cleveland plant has devised a machine with which to spin the commutators at high speed.

Before placing the commutator to be tested in the spinning machine, it is oven-heated to about 350 deg. F. and tightened. It is spun until cold. This takes from ten to fifteen minutes, depending upon the size. After the initial spinning, the commutator is tightened again and the test repeated. This cycle of heating, tightening, spinning and retightening is performed three times on every high-speed commutator.

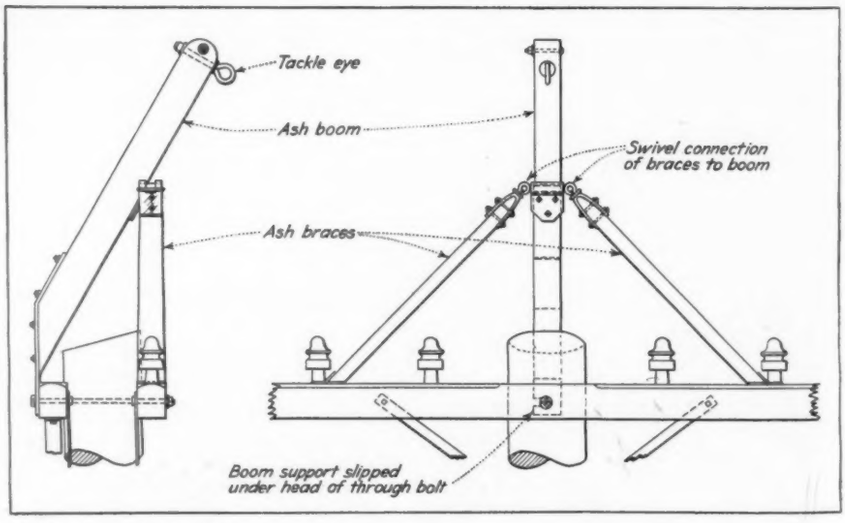
The spinning machine itself consists essentially of a cylindrical chamber of ½-in. steel in which the heated commutator and arbor are mounted on a vertical jackshaft, driven through "V"-belts by an adjustable speed, direct-current motor with a three-to-one range of driving speeds. The motor is rated 2 hp., 600/1,800 r.p.m. (one-hour duty).

Although the spinning machine was developed primarily to season commutators, it has also served as a safety testing device in uncovering defective commutator cores before they can be built into an armature.

The ½-in. steel housing which incloses the commutator was purposely made heavy to withstand the bullet-like force of commutator bars should any ever let go as a result of breaking a core casting. In satisfactory service for the past 1½ years this spinning machine has increased production efficiency and improved the quality of the product by practically eliminating the possibility of "high bars" on high-speed commutators.

Separable Rig for Hoisting Transformers

An estimated time saving of one-third is obtained by the Boston Edison Company through use of the transformer hoist here shown. Transformers up to and including 37.5 kva. rating are placed at pole tops when feasible on the Boston Edison system and this rig, extending above the pole top, easily brings them into position. Attachment of the rig to the pole is quickly accomplished by hand bolting, the spread braces being seated against the pins of the top crossarm to complete a firm support. The device was developed by Frank Landry of the transmission and distribution department and is shown in detail. It is easily hauled up and down by one man with block and tackle, and the swivel construction where the braces are attached to the boom provides necessary flexibility. Boom and braces are of ash, the former being about 4 ft. long and each of the latter 3 ft. in length.



Design for pole top hoist

order L-M transformers

. . *and relax!*

HELP YOURSELF to a care-free vacation this year . . . get rid of transformer worries before you hit the trail. Install L-M Transformers all along the line, and relax.

On utility lines everywhere, in hot and cold climates, in heavy load and light load areas, the service record of L-M Transformers is remarkably trouble-free. Long, trouble-free service life and low maintenance cost are *assured* in L-M Transformers by the exacting care and fine materials that go into every construction detail, from stacking the cores to painting the tanks. You can relax when you buy L-M Transformers because the care that goes into building them is *never* relaxed.

LINE MATERIAL CO.

Spiral on Disk Records Contactor Operation

By J. F. FRESE
Chief Engineer
Monitor Controller Company, Baltimore*

In testing the new Monitor 1,200-amp. contactor it was found desirable to make an accurate record of the mechanical as well as the electrical details of operation. Defects in design, such as sluggish opening and closing, rebound after opening, etc., could thus be discovered and corrected.

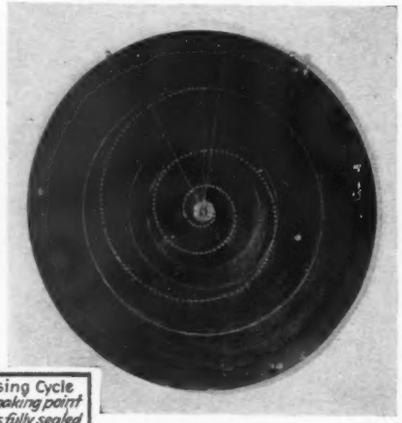
To accomplish this purpose, the arrangement shown schematically below was used. A stiff rod, hanging from the solenoid core, carried at its lower end a pointed steel stylus. The stylus was held in contact with the record disk by tension of a light rubber band. On the face of the steel record disk was a coating of layout varnish—a purple substance which contrasts in color sufficiently with steel that a scratch made in its surface will show up plainly. A cord attached to the rod at right angles to the shaft of the motor prevented the stylus from swinging out of vertical as a result of friction with the rotating disk. A large motor was used to rotate the disk so that no appreciable reduction in speed would result from friction of the stylus.

With the stylus set above and as close to center as practical to minimize wear while running idle, the motor was started, and its speed accurately read. All being in readiness, the solenoid of the 1,200-amp. contactor was energized, its moving core rising and lifting with it the rod and stylus. The stylus, passing in a straight line along the radius of the rotating disk, drew a spiral curve, which was later translated and plotted in the graph shown herewith for the closing cycle.

For the opening cycle the stylus was placed below center and dropped as the contactor opened. This curve is also shown in the graph.

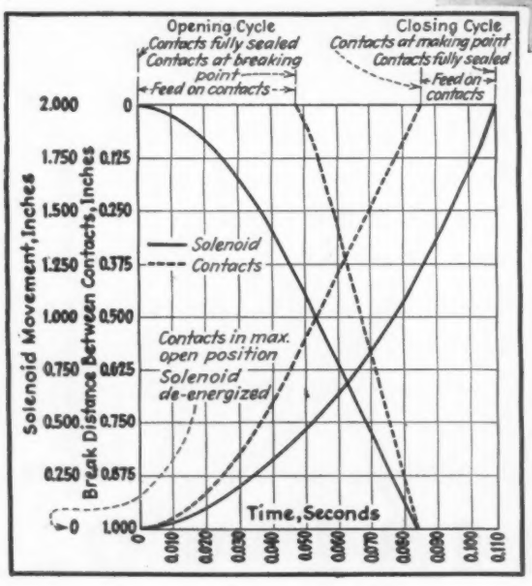
* Inadvertently the address was given as Philadelphia in connection with the item on page 72 of the April 22 issue of Electrical World.

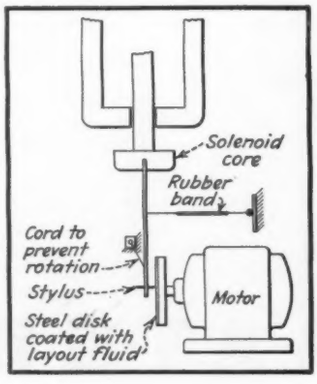
Tester (left) calls apartment number to companion (right) who locates proper meter



Contactor operation traced on rotating disk

Operating time for 1,200-amp., three-pole a.c. contactor





Carrier-Call Sets Aid Meter Checking

A carrier-call device, ordinarily used for office intercommunication, is put to novel use by Consolidated Edison Company of New York, Inc. Meter testers of this utility are using the portable sets as routine practice to serve as a convenient means of communication and as an aid to identifying meters in apartment buildings.

Identification of the meters is necessary to insure proper billing of the consumers. Such a check is made at various times, but for this same purpose, to make sure that the proper tenant is billed for his current consumption, it first is made when the meters are installed. It also is made to follow up a consumer's complaint that he suspects he is being billed for another tenant's energy. Chiefly, however, it is necessary when alterations or changes in numbering of apartments are made. In this case restenciling of the meters may also be required and the new numbers may be easily transferred between the apartment and the basement.

Previously, several schemes were used for locating the proper meters corresponding to the various apartments. One of these consisted of flashing the lights on and off in the apartment; the chance was always taken, of course, that the wrong apartment would be "flashed." With the adoption of the carrier-current device a quick and accurate aid to identification was provided. In addition, since the device plugs into the electric light outlet, the service need not be interrupted.

Only Moloney Transformers

PROVIDE *all* OF THESE FEATURES

Brass cap nuts protect stud threads.

Ratio adjusters are supplied at no extra cost, on transformers on which taps are standard.

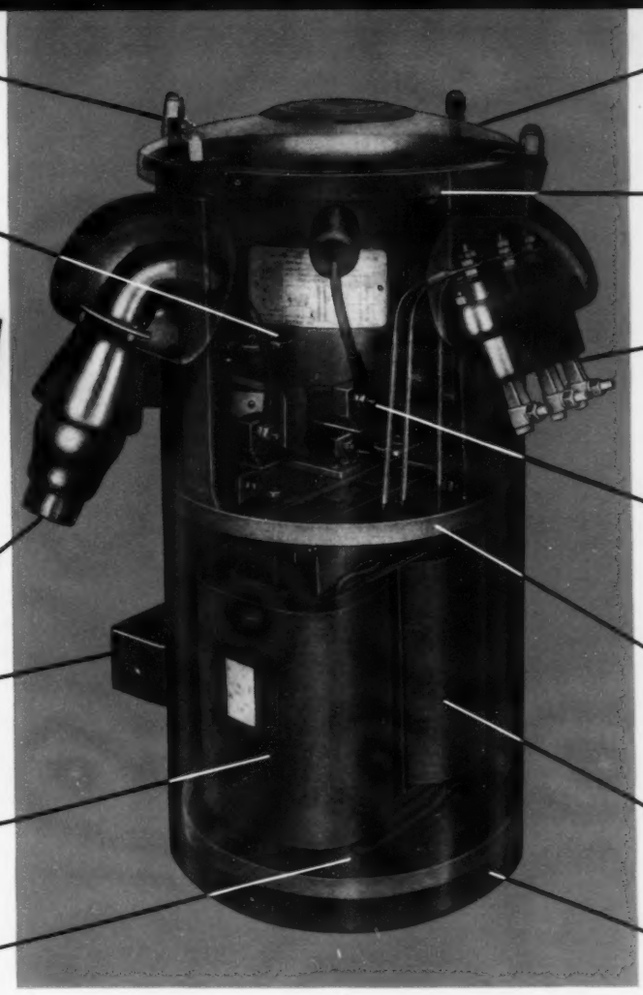
Solderless connector type high voltage bushings available up to 15,000 volts.

Insulating caps provided at no additional cost.

Hanger bracket permits mounting directly to pole. No hanger irons or special plates are required.

"Surge-Proven" core-and-coil unit reduces outages resulting from surges.

Fabricated steel core clamping structure.



Pressed steel cover of heavy gauge stock.

Core-and-coil unit anchored to tank above oil level.

Positive-grip solderless connectors of high tensile strength copper alloy. Neutral is gapped to ground.

Disconnects are provided in the high voltage leads to permit easy removal of bushings or core-and-coil unit.

Circular steel band protects leads and ratio adjustor, and centers unit in tank.

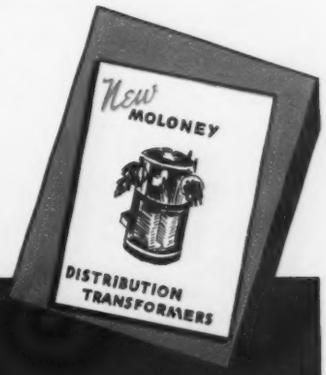
Core type construction permits easy replacement of coils.

Transformer is shipped filled with proper quantity of oil.

Write for Bulletin D-390222

Real Value for Your Transformer Dollar

On no other transformer will you find so many features. Compare Moloney transformers with those of any other manufacture. Compare them feature for feature . . . compare their operating records. You'll discover that you get more value for your transformer dollar when you buy Moloney transformers.



MOLONEY ELECTRIC CO.
ST. LOUIS MISSOURI

LOAD BUILDING

Utility Promotes Local Stoker Sales

A domestic stoker promotion plan recently developed by the Kansas City Power & Light Company, in co-operation with dealers and the local Bituminous Coal Utilization Committee, by putting automatic heat within the reach of a new group of home owners has opened a new source of domestic revenue to the company. The plan allows stokers to be sold on terms of $5 down and three years to pay the balance on the electric service bill. Under such terms the average person can make monthly payments plus the cost of fuel at an over-all reasonable cost compared to other automatic types of fuel.

Several factors are listed by the company for joining the co-operative movement after satisfactory testing of fuel and stokers. They are:

1. The stoker produces an E.A.R. of $5 to $9 yearly.
2. Actual tests show that many more homes were afforded automatic heat because fuel costs averaged $40 to $70 a year on five- and six-room houses.
3. The company was interested in promoting new construction through speculative builders who would include all electric kitchens or ranges and water heaters and the automatic coal stoker fitted admirably into this plan.
4. For several years the company has been conducting a co-operative promotion on electric ranges and water heaters with dealers, financing on the electric service bill the sales ofdealers and furnishing them with installation mechanical service and home economist service. The addition of automatic coal stokers to this program would afford another opportunity to help the promotion of electric cooking and water heating.

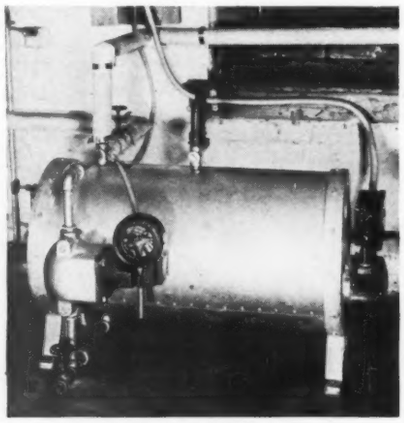
The Bituminous Coal Utilization Committee, originator of the plan, is composed of representatives of coal producers with headquarters in Kansas City. For its share of the promotion this committee is furnishing the advertising to promote the use of automatic coal stokers. The newspaper advertising campaign was inaugurated on February 26 and plans call for a total of 33,300 lines on Sundays for the balance of 1939.

•

Electric Heat Lowers Temperatures, Costs

By E. A. ROOF
Northern Virginia Power Co., Winchester, Va.

"If it can be done, electricity can do it" is rapidly becoming a working slogan with our commercial representatives and power sales engineers. One of the latest examples of their ingenuity in adapting electrical equipment to unusual jobs is the installation of an electric steam generator in the Winchester Knitting Mills at Winchester, Va.



Electric boiler for knitting mill

Large steam press for knitted goods formerly supplied by coal-fired boiler now fed by boiler equipped with "Chromalox" immersion units

This company was faced with the problem of irregular operation of a steam press used for pressing finished goods. Under the old set-up, a 100-hp. coal-fired boiler supplied the steam. It was necessary to fire this boiler three to four hours ahead of the time it was to be used. Not only was this inefficient, inconvenient and costly, but it made the plant uncomfortably warm in the summer.

A survey by the two above-mentioned departments of our company resulted in a recommendation for the installation of an electric steam generator.

Today, steam is available within a half hour without attention and without excess heat. Operation is entirely automatic and completely safe. The unit has two 7½-kw. immersion heating elements.

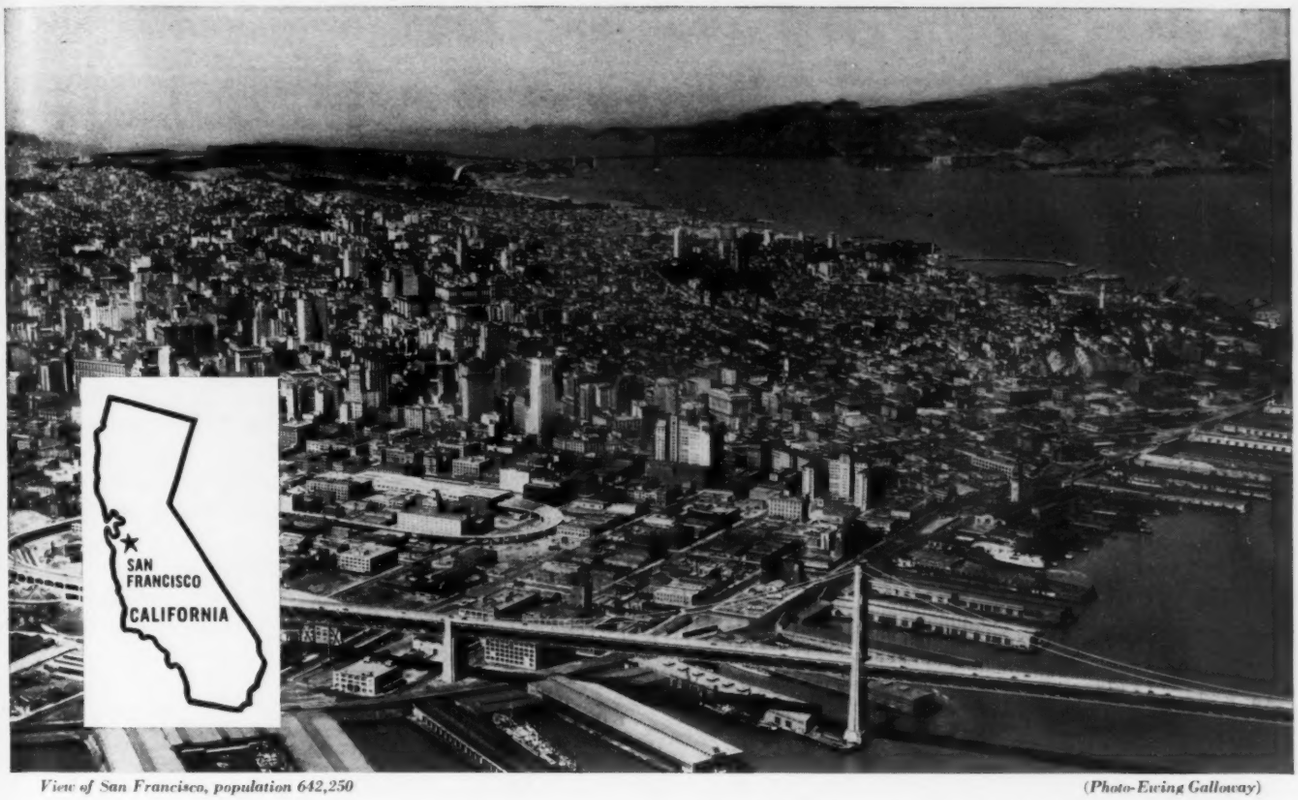
The electric steam generator has been on the job for about a year and has proved so satisfactory in every respect, including saving of money, that the mill management plans to install an additional press with a resultant increase in load from 15 kw. to 24 kw. in the near future.

•

New Coffer System for New York Bank

The advanced system of coffer lighting installed recently in the banking rooms of Irving Trust Company, New York, is designed so that the eye can detect no disturbing brightness from any point in either the bank's main room or private offices. The overhead coffer system provides 25 to 30 ft.-candles at desk level.

Fifty-five coffers, each 6 ft. square and 18 in. deep, are used in the main overhead system. Concealed in the square metal lamp-holder of each coffer is a 300-watt inside frosted lamp. Despite the use of 6.3 watts per sq.ft., ceiling brightness is low.



View of San Francisco, population 642,250 (Photo-Ewing Galloway)

Selling lamps and lighting in SAN FRANCISCO, CAL.

(and cities of similar size)

IN YOUR CITY. You can easily estimate the approximate number of lamp and lighting advertisements General Electric is delivering to your customers by applying the following national averages:

Going into the average wired home in 1939

14 magazines with G-E lamp ads
5 newspapers with G-E lamp ads
5 radio messages

24 total advertising messages

• • •

In the last 10 years, the average wired home received

158 magazines with G-E lamp ads
30 newspapers with G-E lampads
20 radio messages

208 total advertising messages

HERE'S a rapid view of the way that General Electric advertising is constantly at work in San Francisco, promoting light-conditioning for Better Light-Better Sight. Into San Francisco homes every week goes a steady stream of G-E lamp and lighting advertisements amounting to 45 impressions per person in the last ten years.

IN 1939 . . . 2,160,000 magazines with G-E lamp advertisements and 700,000 radio messages.

SINCE 1929 . . . 22,788,000 magazines with G-E lamp advertisements.

FALL 1938 . . . 1,353,000 copies of newspapers with G-E lamp advertisements.

LAST 3 YEARS . . . 3,845,000 newspapers with G-E lamp advertisements.

SINCE 1929 . . . 29,433,000 advertisements in magazines, newspapers, and radio. Which is approximately 45 advertisements per capita.

EDISON MAZDA LAMPS

GENERAL ELECTRIC

Advanced coffer system of lighting employed in New York bank

When viewed at a moderate distance the coffer openings give the appearance of frosted glass surfaces.

Sprinkler-heads, which are ordinarily an eyesore, are arranged so as to mark the corners of the coffers throughout the lighting system.

The side office space is lighted by 18-in. square coffers, 6 in. deep, fitted with 6¼-in. cubes of white glass supplied by the Macbeth-Evans Division of the Corning Glass Company. They are equipped with 40-watt lamps.

•

Roaster Sales Under Way in Wisconsin

Wisconsin Electric Power Company and the dealers associated with it are reported to have sold some 18,000 electric roasters last year, with the support of a vigorous campaign of demonstrations and advertising backing up an aggressive sales campaign.

Huge cooking schools, with complete electric roaster demonstrations by the company's home economists, are considered the key to this success. Owners of roasters who attended them learned many new roaster uses and recipes which they naturally enjoyed describing to their neighbors at home. Thousands of new customers were obtained in this way.

A "cooky show," to which the general public was invited, proved another important feature in stimulating widespread interest. This exhibit, which took place in the company's display room, presented the many different kinds of cookies which can be baked in the electric roaster. It was visited by thousands of women from all sections of the area served by the utility.

•

To Develop Water Heating Load

Looking toward the wider use of electric water heating in smaller homes, the Hartford Electric Light Company recently established a controlled service with long-hour usage as a supplement to the night storage heating facilities which have been developed during the past few years. The service is limited to tanks of 30 to 50 gal. capacity, the rate being at 5 mills discount from the electric home rate for the energy consumed by the controlled heating unit. The company anticipates that the addition of the controlled service with the longer charging hours and consequent reduction in the size and price of the tank will open a field which has not been readily available previously. At present much necessary preliminary work is under way in connection with the organization of the market, establishment of installation routine and co-operation with plumbers and dealers.

The larger water heating service continues on a night storage basis with an eight-hour charging cycle, at a rate of 1 cent per kilowatt-hour. The company has discontinued placing water heaters on the rental purchase plan, opening the field widely to dealer sales. There are now about 2,500 of the eight-hour units in service on the system, giving an average energy consumption of about 4,800 kw.-hr. annually.

•

National Sales Trend Reversed in Florida

Florida Power & Light Company had four major sales campaigns last year—The Florida Quest, The Valley Foilers, The Thrifty Three and the Xmas Sales Jamboree. The sale of electric cooking and water heating was promoted during each campaign.

Company and dealer sales of major appliances in the territory during 1937 and 1938 as compared with national sales were as follows:

	Sales 1937	Sales 1938	% Inc.	Aver. Nat'l % Inc.
Ranges	5,045	5,592	11	—38
Refrigerators	16,208	15,123	—7	—46
Water heaters	2,616	2,844	9	—13

During this period the company entered the Water Heating Contest, participated in the "Spring Showing" and "Discovery Month," built a new demonstration kitchen in Coral Gables office and modernized two demonstration kitchens in the Ft. Myers and Bradenton offices. It distributed the Electric Kitchen Manual to key architects, posted the Kitchen Planning Service signs in offices, used outdoor Modern Kitchen banners for some new homes, showed the sound slide film and record and used the Spring Kitchen Showing banners in connection with window displays. It furnished this promotional material to division offices, gave them the story of the Spring Showing activity and enlisted the co-operation of the dealers in the territory.

Also used were reprints of the Modern Kitchen Bureau ads, "My Kitchen was Haunted" and "I Kissed a Spook Good-bye."

Early in 1938 the company entered the Modern Kitchen Bureau's Water Heating Contest. Bulletins were sent to salesmen informing them of the contest for the best letters on "How I Sell Electric Water Heating," executives and engineers were informed of the contest for the best papers on "Advisability of Competitive Water Heating Rate and Advantages of the Water Heating Load" and entries were submitted for the Water Heating Display Contest.

Buell will accomplish this for you

Buell Dust Collectors bring you that combination of high efficiency and low cost which the patented Van Tongeren system is demonstrating in more than a thousand installations.

Those installations are earning the good will of workmen and of entire communities. They are earning equally important and more tangible profits in the salvaging of valuable dusts, the processing of a great variety of products, the reduction of many operating and overhead costs.

For a clear, practical presentation of dust collection or fly ash correction ask us for *Bulletin D81* (on industrial dusts) or *Booklet A93* (on fly ash). Either, or both, will be sent free to any managing executive or operating engineer.

The Only Cyclones with a Dust Pocket

BUELL ENGINEERING COMPANY INC
Suite 5000, 75 Pearl Street, New York

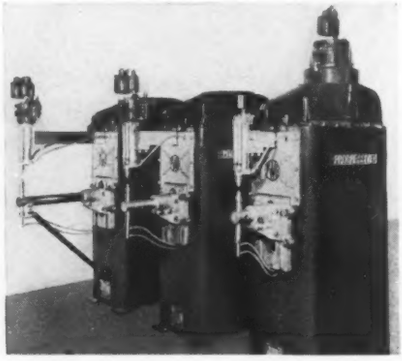
SALES OFFICES IN PRINCIPAL CITIES

buell
DUST COLLECTORS

NEW EQUIPMENT

Spot Welder

Both welding pressure and current in this new spot welder are applied through a cable-less welding head. Claimed advantages of this design are the elimination of



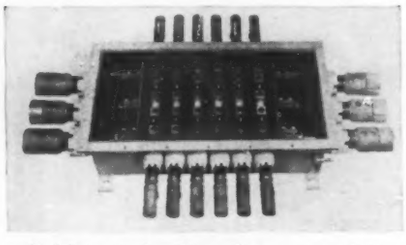
"Multi-Duty" spot welder; direct air-operated unit, with arms extended, left, partly retracted, center; arms fully retracted, with air-hydraulic booster added for heavier work, right. **Progressive Welder Co.**, Detroit, Mich.

flexible connections in favor of solid arms, interchangeable use of air-hydraulic or pneumatic boosters for pressure application, widened range of uses because of more accurate pressure control, use of guns individually or in multiple—mounted vertically, horizontally or at angles—interchangeable use of 75 to 150 kva. and larger transformers. Arms can be moved out to accommodate work up to 36-in. depth in handling large, light-weight sections.

•

Subway Boxes

To withstand severe manhole conditions a stainless steel subway box is now available for which extremely high corrosion resistance is claimed. Boxes are said to be non-magnetic and, because of the added strength of stainless steel, to have thinner walls, thus reducing weight and making installation easier. Welded seams of the new boxes are said to be water-tight, strong and of equal corrosion resistance as side walls.



Stainless steel subway boxes, secondary cable box shown. **G & W Electric Specialty Co.**, Chicago, Ill.

•

Panelboard Breaker

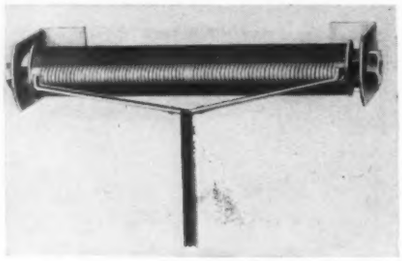
Electro-magnetic, non-thermal panelboard breaker; in ratings to 50 amp. on 125 volts, a.c. **Heinemann Electric Co.**, Trenton, N. J.

Designed for assembly in lighting panelboards, this magnetic circuit breaker with fully magnetic inverse time delay operates without thermal elements. Magnetic trip with time delay gives delayed trip on harmless overloads and instantaneous trip on short circuits.

•

Voltage Regulator

Commutator-type regulators are announced to permit regulation of larger a.c. generators than is possible with the smaller wound-resistor type. Stacked commutator segments replace the wound resistor, providing fine, continuous voltage adjustment. Each segment is connected to the tap on a vitreous-enameled plaque-type resistor. With each regulator is required a potential transformer.



Alternator voltage regulator, automatic-rheostatic type; to handle synchronous generators up to 2,000 kva., three-phase, 60 cycles. **Ward Leonard Electric Co.**, Mount Vernon, N. Y.

•

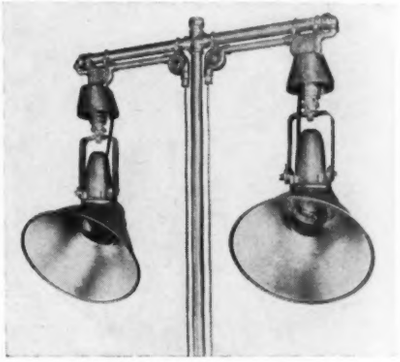
Welding Electrode

"Readyweld" electrode; 3/32 x 12 in.; current range, 25 to 85 amp. maximum. **The Lincoln Electric Co.**, Cleveland, Ohio.

Intended for use with a.c. transformer type welders which have low open circuit voltage, this new electrode is a low-carbon steel rod with a heavy extruded shielded arc coating, designed to have necessary stability and ease of restriking.

Floodlight Hangers

To facilitate and widen the use of floodlights, this company has developed disconnecting and lowering hangers for floodlight use. Not only does this development



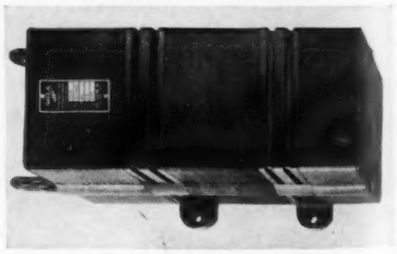
Double mounting of floodlights with "Thompson" lamp-lowering hangers. **The Thompson Electric Co.**, Cleveland, Ohio.

aid the cleaning, relamping and servicing of high-mounting lighting units, but it also permits radial and vertical adjustment of the light beam to be made on the ground. As many as 13 floodlights may be mounted on one pole, the manufacturer states.

•

Transformers

Constant-voltage transformers, combining a resonant electrical circuit and a high leakage-reactance magnetic circuit, are designed to maintain their output to within plus or minus one per cent for a total primary variation of 30 per cent. Constant-speed motors, high-voltage rectifiers, photo-electric cell equipment, electro-plating, instrument calibration and routine production testing are suggested applications.



"Sola" constant-voltage transformers; standard designs supplied in ratings up to 3,000 va., delivering 115 volts on the secondary (models also offered for 6 volts secondary). **Sola Electric Co.**, Chicago, Ill.

Announcing!

CON-D-TREAT POLES

the DOUBLE TREATED *pine pole**

Clean, chemically treated poles sealed with creosote against decay at the ground line.

ZMA for cleanliness, then Creosote butt treatment for extra ground line protection.

"The Cleanest Pole for Maximum Life"

You need hesitate no longer in specifying ZMA salt treated poles with their special advantages of absolute cleanliness. We now offer these at very attractive prices with the added advantage of creosote penetration at the ground line and throughout the butt section.

Write for details

D-T TRADE MARK

E. F. CONGER CREOSOTING CO.
STAUNTON, VIRGINIA

or

NORFOLK CREOSOTING CO.
NORFOLK, VIRGINIA

THE PIEDMONT CO.
AUGUSTA, GEORGIA

CON-D-TREAT POLES

Copyright 1939 by E. F. Conger Creosoting Company

* Patent applied for

RUBBER COVERED POWER CABLES • BUILDING WIRE

CRESCENT
ENDURITE

PERFORMS

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESFLEX NON · METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

ENDURITE Insulated Wires and Cables
Combine the Maximum in PERFORMANCE and ENDURANCE

PERFORMS:
They lower the cost of installation because of the ease with which they can be handled and pulled in; because the insulation is free stripping and leaves the copper conductor bright and clean to facilitate rapid connections; because of CRESCENT quality and superior service.

ENDURES:
ENDURITE Insulation is especially resistant to deterioration from heat and is suitable for operations at copper temperatures up to 75° C, permitting high current loads and installations in hot locations. Its superaging qualities assure maximum life and make it the wire to use for the toughest locations and important jobs.

ADEQUATE WIRING SERVES AND SAVES

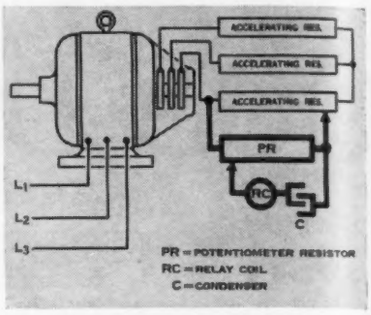
CRESCENT
INSULATED WIRE & CABLE CO. INC
TRENTON, NEW JERSEY

Atlanta Baltimore Boston Buffalo Chicago Cincinnati Cleveland
Detroit Indianapolis Kansas City Los Angeles Minneapolis
New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco

CRESCENT ENDURITE SUPER · AGING INSULATION

A.C. Magnetic Control

New control scheme for application to cranes and hoists and other industrial drives of the reversing and non-reversing type employs a resonant circuit consisting



Frequency relay magnetic control for a.c. wound-rotor motors. **The Electric Controller & Mfg. Co.**, Cleveland, Ohio.

of a frequency-relay coil, condenser and potentiometer resistor, with this circuit receiving its operating voltage from the rotor circuit of an a.c. wound-rotor motor. The control is designed to match exactly motor torque to the load requirements and thus to provide for checking of speed, permit faster lowering of a load or normal acceleration of the motor.

•

Sound Level Meter

With a range of plus 50 to 125 db., this portable sound level meter is designed to cover all usual sound measurements, such as transformer hum, vibration of motors and rotating machinery, electric refrigerator noise and the like. Sound

"Pattern 15 Soundmaster"; accuracy of plus or minus 2 db.; battery designed for normal 300 hours operation. **John Meck Instruments**, 164 No. May St., Chicago, Ill.

pick-up is accomplished with a piezo-electric crystal microphone of the non-directional ball type. Output of the microphone passes through a battery-operated amplifier to the indicating meter, a D'Arsonval type employing an alnico magnet. Switch on the front panel allows checking of battery voltages with the indicating meter. Compensators are provided to guard against errors due to change in battery voltage.

•

Single-Disk Meters

Completing a line of single-disk meters for polyphase metering, this company has announced single-disk, three-element meters built with three complete electro-

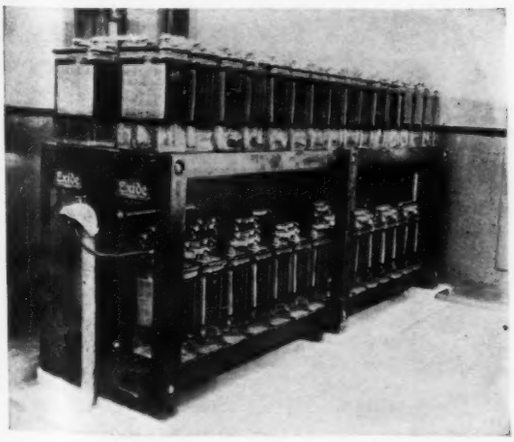
—for all switching operations at this Snake River, Idaho, hydro-electric plant

A COMPREHENSIVE system of oil circuit breakers characterizes the Idaho Power Company's most recently completed hydro-electric plant on the Snake River at Upper Salmon Falls.

Guided by the experience gained in designing and equipping five earlier hydro-electric stations on this same body of water, the company's engineers naturally selected for this latest development, equipment which had proved its quality and dependability.

That's why, in deciding upon a thoroughly dependable source of direct current for the operation of the oil circuit breakers and for the emergency illumination of the station interior, they chose a 60-cell Exide-Chloride Battery of 120 a.h. capacity.

In plants all over the country, Exide-Chloride Batteries are the choice of experienced engineers who demand absolutely dependable power for control bus, exciter and other stationary services. If you are not familiar with the remarkable construction and performance of these batteries, write for Bulletin 204. It may help solve battery problems.



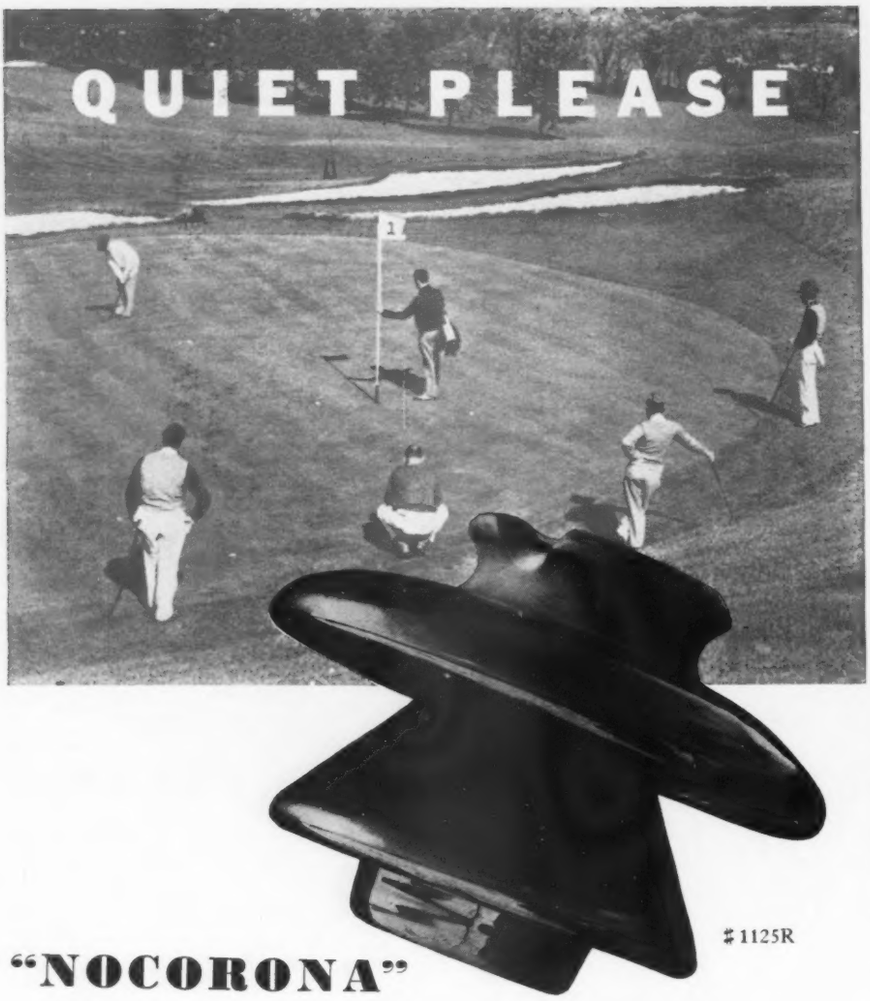
Exide-Chloride Battery of 60 cells used for operation of oil circuit breakers and for emergency lighting in station, at Idaho Power Company's hydro-electric development shown above.

THE ELECTRIC STORAGE BATTERY COMPANY

The World's Largest Manufacturers of Storage Batteries for Every Purpose

PHILADELPHIA

Exide Batteries of Canada, Limited, Toronto



#1125R

"NOCORONA"
-Quiet as a Champion's Caddy

PINCO
INSULATORS

Because
Pinco "NOCORONA" Insulators

1. Have "fired in" radio proofing—physically and ceramically a part of the insulator.

2. Have smooth conductor surfaces, are free from "fringe effect" and remarkably resistant to arcover burns.

3. Have rugged construction, unaffected by "NOCORONA" treatment.

4. Have been manufactured for years by approved Pinco processes.

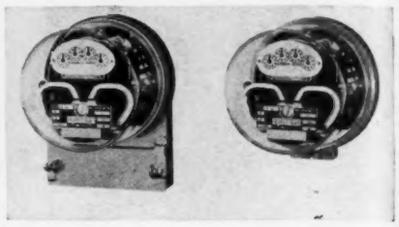
5. Have service records *proving* quietness at operating voltage.

SEND FOR SAMPLES

The Porcelain Insulator Corporation
LIMA, NEW YORK

Sales Agents—THE JOSLYN COMPANY—New York, Rochester, Philadelphia • JOSLYN MANUFACTURING & SUPPLY CO.—Chicago, Kansas City • JOBBERS SUPPLY CO.—St. Paul, Portland, Seattle • SOUTHEAST JOSLYN COMPANY—Cincinnati, Cleveland, Atlanta • J. J. COSTELLO—Boston • JOSLYN CO. OF CALIF.—Los Angeles, San Francisco • H. E. BURNS CO.—Pittsburgh SOUTHERN JOSLYN CO.—New Orleans • PAUL DOUDEN—Denver • JOSLYN SOUTHWEST CO.—Dallas

magnetic elements for use on four-wire, three-phase circuits. Mounting dimensions are identical with the corresponding two-element single-disk meters. For power factor compensation, each element has an auxiliary winding on the current element. Light load adjustments are supplied only on left- and right-hand elements, these having sufficient range for calibrating the meter at light load.



Type "L-3-P" meter, left, bottom—connected with standard polyphase terminal block; Type "L-3-S," right, for socket mounting. **Sangamo Electric Co.**, Springfield, Ill.

•

Plating Racks Coating

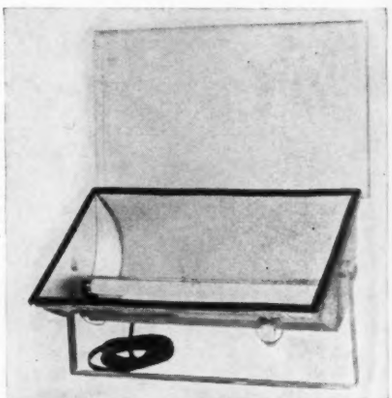
"Wrap Rax"; available in 1-lb. rolls of standard width, ¾ in. Marketed by **Hanson-Van Winkle-Munning Co.**, Matawan, N. J.

A new protective coating for electroplating racks is a synthetic thermoplastic resin in tape form characterized by its ability to resist the cleaning, pickling and plating solutions commonly used in electroplating. In addition, the dielectric properties of the tape provide insulation.

•

Fluorescent Floodlights

For outdoor color illumination of buildings, signs and posters, a fluorescent floodlight has been announced. The new units are said to produce as much light with 15 watts as is possible with incandescent floodlights of from 30 to 375 watts, depending on the color of light produced. Aluminum trough-type reflector also serves as housing; a hinged rubber-gasketed door with clear glass covers the tubular lamp.

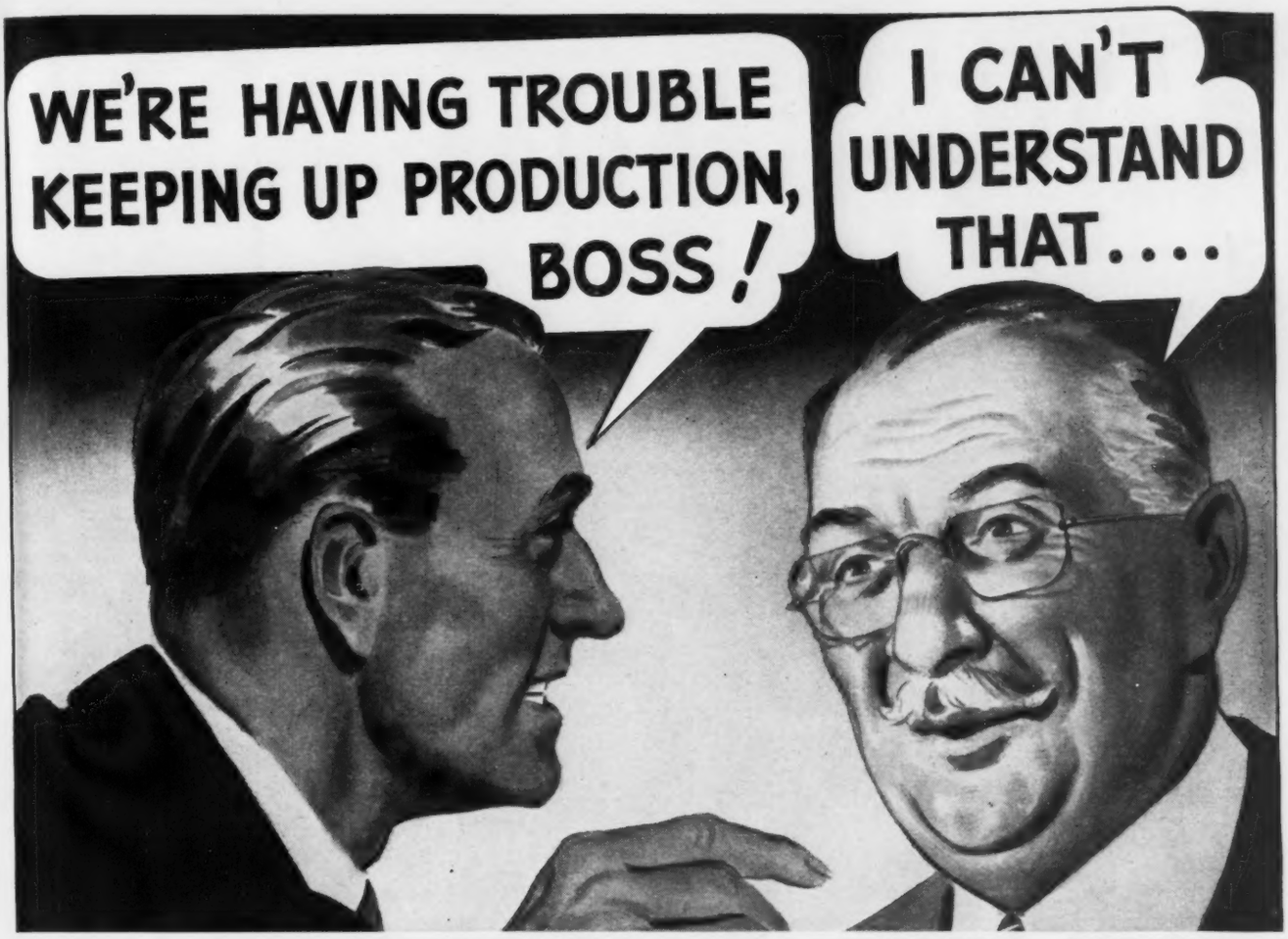


Type "L-53" fluorescent floodlight, door open; for use on 115 volts, 60 cycles with 15-watt, 18-in. "T-8" fluorescent lamp. **General Electric Co.**, Schenectady, N. Y.

•

New Stroboscopes

Two new portable stroboscopes are offered for speed measurement and slow motion studies of rotating and reciprocating mechanisms, such as motors, engines, gears, shafts, flywheels and the like. Strob-



I CAN! YOUR PLANT IS BADLY ILLUMINATED. AND BAD LIGHTING CUTS DOWN EMPLOYEES' EFFICIENCY
BUT WHAT CAN I DO ABOUT THAT?
PAINT PROFITABLE ILLUMINATION INTO EVERY ROOM.. WITH PITTSBURGH GLORIFIED LIGHT PAINTS. YOU'LL INCREASE PRODUCTION, CUT ACCIDENTS AND MAKE EMPLOYEES HAPPIER
LATER
SO THEY TOOK MY ADVICE AND PRODUCTION IS GOING UP. I'M IN A NICE BOX OF CIGARS, TOO

YOU WANT employees to work with maximum efficiency. So make sure every room is properly illuminated. And that means properly painted. For even with the most carefully designed lighting, you may not have correct illumination if walls and ceilings are not scientifically finished to distribute this light.

Pittsburgh Glorified Light Paints have been perfected under the guidance of leading authorities on light control. They are scientifically prepared to reflect and diffuse available raw light—to turn foot candle power into profitable illumination. Naturally this brings better working conditions all around. There is a Pittsburgh Glorified Light System for every type of factory. Send for book, "Glorified Light" and find out how these finishes will benefit you.

PITTSBURGH PLATE GLASS CO., PAINT DIVISION, PITTSBURGH, PA.

THERE IS A GLORIFIED LIGHT PRODUCT FOR EVERY TYPE OF PLANT!

THE SNOLITE SYSTEM will bring profitable Glorified Light into any plant with normal interior surfaces.

THE SNOTEX SYSTEM is specially designed for all abnormal interior surfaces except those affected by fungus growth. It resists discoloration from humidity, fumes, gases.

THE FUNGUSIDE SYSTEM effectually retards the growth of fungus. It is vitally necessary in bakeries and food plants —wherever fungus presents a serious problem.

PITTSBURGH PAINTS

Smooth as Glass

COMPLETE LINE OF STRUCTURAL MAINTENANCE FINISHES

Copr. 1939 Pittsburgh Plate Glass Co.

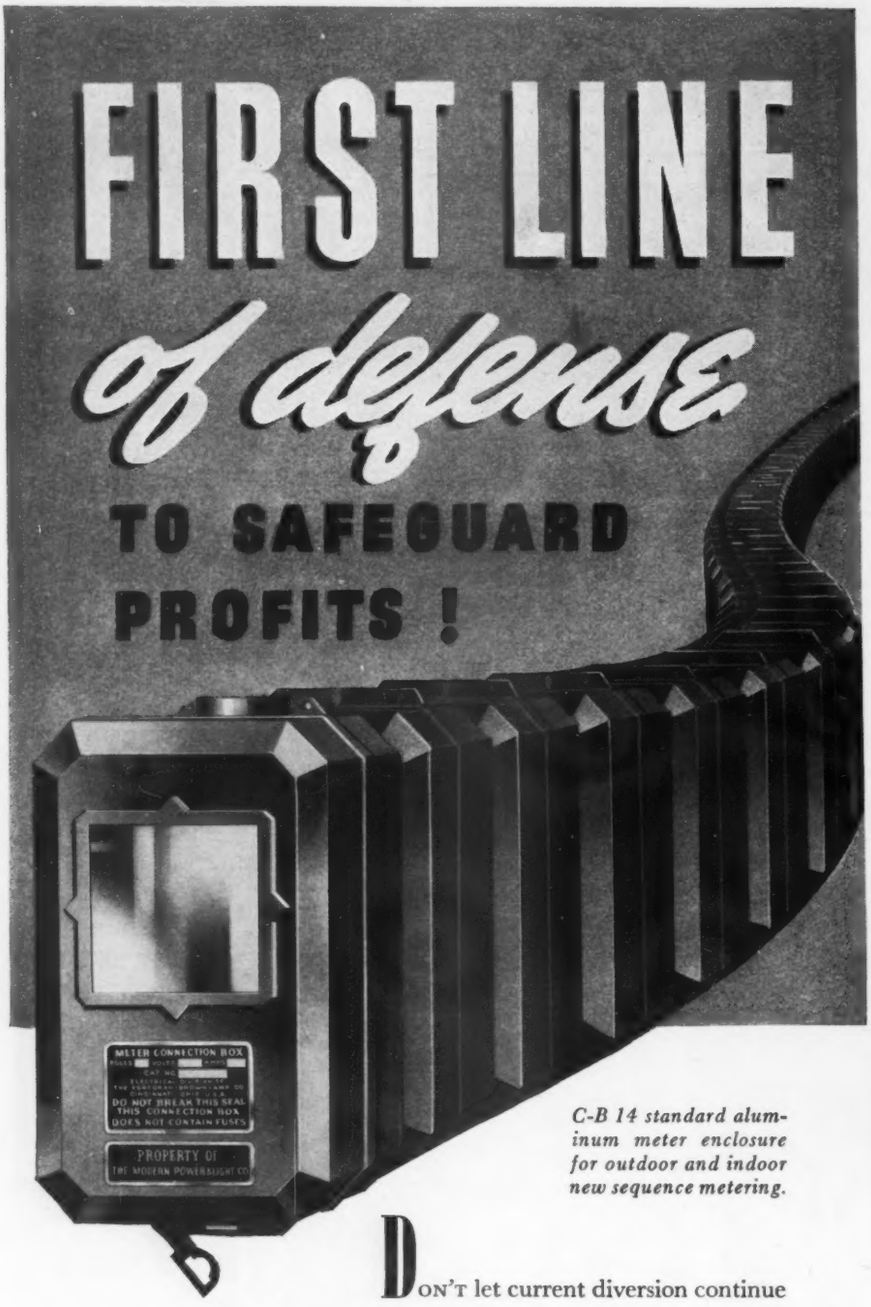
Pittsburgh Plate Glass Company
Paint Division, Dept. EW5,
Pittsburgh, Pennsylvania
Send me free your book, "Glorified Light".

Name_____

Address_____

City_____ State_____

FIRST LINE *of defense* TO SAFEGUARD PROFITS !



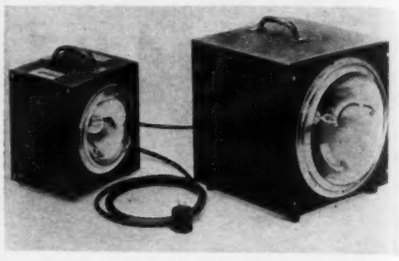
C-B 14 standard aluminum meter enclosure for outdoor and indoor new sequence metering.

DON'T let current diversion continue to cut into earnings! Lick this problem for all time with C-B tamper- and alteration-proof New Sequence Service Entrance Equipment, and prevent revenue losses. But C-B equipment does more than stop diversion. It modernizes every meter installation; places the meter in a position of high visibility, where it can be read quickly; sharply reduces installation time and labor; gives extra years of trouble-free service. The cost? Only a fraction of the current diversion losses themselves. Consult the utility trained C-B technical staff without obligation.

C-B Catalogues 57, 58A, 61, 62 and 63 are of interest to every utility executive. Copies for the asking.

Electrical Department
CORCORAN-BROWN LAMP DIVISION
THE ELECTRIC AUTO-LITE COMPANY
4900 Spring Grove Avenue Cincinnati, Ohio

oscopic light is directed on the machine under measurement and the flashing rate adjusted until the motion appears to be stopped, when the speed is read from a scale graduated in r.p.m. A larger unit,



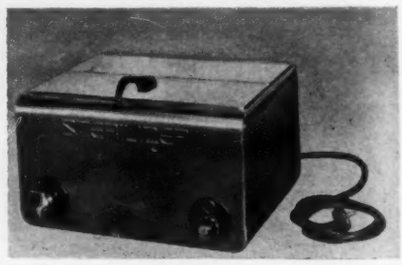
Type "631-B Strobotac," left; accuracy of plus or minus 1 per cent, requires 25 watts, gives speeds directly from 600 to 14,400 r.p.m., weighs 10 lb.; Type "648-A Strobolux," right; requires 150 watts, weighs 25 lb. **General Radio Co.**, Cambridge, Mass.

furnishing about 100 times as much light as the smaller, is used in conjunction with it when larger areas are to be illuminated or where background lighting is strong. It can also be used as a light source for single-flash photography. Both units operate from a.c. line.

•

Electric Sterilizer

Designed for plugging into a convenience outlet, this 1,500-watt sterilizer provides an approved means for handling up to 4,000 glasses per day in drug stores, at soda fountains, in cafeterias, and other locations where the cleansing of such receptacles, plates, silverware, etc., is either required by law or an appreciated need of progressive merchandising of drinks,



Portable sterilizer; assuring surgically clean glassware after one or more minutes' immersion in hot water. Dimension 18x14⅜x 9⅞ in. Models for a.c. and d.c. service. **Hydrotherm Sterilizer Corp.**, 250 Stuart St., Boston, Mass.

ices and foods. The washed and rinsed glasses are placed in a wire rack and the cover closed; two 750-watt thermostatically controlled Wiegand "Chromalox" heating elements provide the source of temperature rise, and this may be set for a range of 160 to 212 deg. F. A pilot light in the thermostat adjustment button shines when the water temperature drops below the required level. The average energy consumption in long-hour service is 600 watts.

•

Armature Winding Head

"Ideal" armature winding head. **Ideal Commutator Dresser Co.**, Sycamore, Ill.

New winding device for small universal, shaded pole, two pole d.c. or repulsion induction motor armatures is adjustable to many types and sizes of armatures. Wing jaws are adjustable to take armatures up to 3 in. in diameter with 2¼ in. maximum stacking and these jaws can be tilted to suit the skews of the slots.

New! USKORONA

A CORONA AND MOISTURE RESISTING SPLICING COMPOUND

Listen in! Raymond Paige, 99 Men And A Girl, Wednesday Evenings, C. B. S.

Electrical Engineers, charged with the responsibility of the design, installation, operation, and maintenance of power lines where corona (ozone) or moisture are problems, will be interested in this latest development of the U. S. Rubber Company Laboratories.

Uskorona is an entirely new type of insulating compound offering maximum resistance to ozone, moisture and ageing without sacrificing elongation, high dielectric or tensile strength. It fuses instantly and is unaffected by low temperatures.

Uskorona provides ideal insulation in splicing and jointing electrical conductors for single or multiple cables used on underground power lines, on secondary network systems, on underground street lighting circuits, on transformer leads, etc.

Samples and complete information sent on request.

UNITED STATES RUBBER COMPANY · US · TRADE MARK

United States Rubber Company

1790 Broadway, New York

ALSO U. S. ELECTRICAL WIRES AND CABLES, LINEMEN'S BLANKETS, SWITCHBOARD MATTING

NEWS ABOUT PEOPLE

Wisconsin Utility Names Schubert Vice-President

William E. Schubert, general manager of the Wisconsin Michigan Power Co. for the past three years, has been elected a vice-president of the company. Mr. Schubert first became associated with the Wisconsin Michigan utility in 1923 while attending school, and shortly after assuming full-time duties for that company became chief engineer. He served in that capacity until 1932, when he was appointed assistant general manager. In 1936 he was appointed general manager.

He started his public utility career as electric meter installer in 1914 with the Milwaukee Electric Railway & Light Co., now Wisconsin Electric Power Co. While pursuing his studies, he worked in the power plant department of the electric company at Milwaukee. He was graduated from the University of Wisconsin in 1924 as a Bachelor of Science and received his mechanical engineering degree in 1929.

•

▶ ROBERT LOEWE is now serving as an electrical engineer with the Commonwealth & Southern Corp. at Jackson, Mich. He was formerly distribution transformer design engineer with the Westinghouse Electric & Manufacturing Co. at Sharon, Pa.

•

C. F. Sheakley Appointed Superintendent of Lines

C. F. Sheakley has been appointed to the position of general superintendent of lines of the West Penn Power Co. Mr. Sheakley is well known in the electrical engineering field and is particularly fitted for his new position. As a graduate of Carnegie Institute of Technology, he began service with West Penn in 1919. Starting as a substation electrician, he advanced rapidly with the company, serving in various engineering capacities.

In 1930, when a consolidation of all lines activities took place, Mr. Sheakley was named assistant general superintendent of lines, the position he has held until the present time.

As general superintendent of lines Mr. Sheakley will have control of the engineering, construction, operation and maintenance of all transmission and distribution lines and equipment of the entire West Penn System.

Westinghouse Names Smith to Direct All Engineering

Marvin W. Smith, manager of engineering of the Westinghouse Electric & Manufacturing Co., has been elected a vice-president of the company. Mr. Smith, who will direct all the company's engineering activities, has been associated with Westinghouse since the day he left college in 1915.

Westinghouse

Going to Westinghouse because he "was interested in electricity," Mr. Smith began as a student engineer, did shop and office work, then moved steadily upward. He has been manager of engineering since 1936.

In 1917 he was assigned to the power engineering department, where the large rotating electrical machinery supplied by the company was designed and manufactured. He began as a design engineer and since that time he has been identified with the design and construction of electrical generating equipment.

From 1927 to 1930 he served as section engineer of the power department and in 1930 he was appointed division engineer. Then he became manager of engineering. In 1938 Mr. Smith received the Westinghouse Order of Merit

ORANGEBURG HAS *long* BEEN PART OF

© Fairchild Aerial Surveys, Inc.

In less than a quarter of a century Detroit has become one of the world's most important manufacturing cities . . . bounding in growth that has called for the finest of planning and engineering in providing an underground distribution system not only adequate for today's heavy needs, but anticipating tomorrow's heavier requirements.

ULTIMATE ECONOMY

Savings in material costs plus savings in installation costs are not the sum total of the Orangeburg "points that count."

Wherever electrical raceways are to be installed underground, "downtown" or "suburb", one duct or sixty, Orangeburg is an insurance policy for permanent cable protection.

Orangeburg, trademark, is a guarantee of the best of Fibre Conduits, a time-tested enduring "service" of cable protection *wherever electrical raceway facilities are to be installed underground.*

● Orangeburg Fibre Conduit backs up its *immediate* economy with *ultimate* economy of *scores* of years of trouble-free cable protection. The test of time in actual experience . . . installations of more than 40 years . . . prove Orangeburg's easy resistance to the most destructive conditions of corrosion, temperature extremes . . . and physical abuse.

No cost-saving compromise is tolerated in Orangeburg's production of the finest conduit for true economy in permanent service and enduring cable protection. Constant checking of materials and processes, continuous research and product improvement, and ever-increasing standards of performance firmly intrench Orangeburg Fibre Conduit as your number one investment in trouble-free cable protection.

For installation underground WITH CONCRETE ENCASEMENTS Orangeburg STANDARD FIBRE CONDUIT is recommended for duct banks (4 ducts and over), main distribution, high tension and "downtown" locations.

For installation WITHOUT CONCRETE ENCASEMENTS, the Orangeburg dual-economy NOCRETE conduit is recommended for service entrances, extensions, parkways and street lighting, suburban distribution, laterals, signal systems, etc.

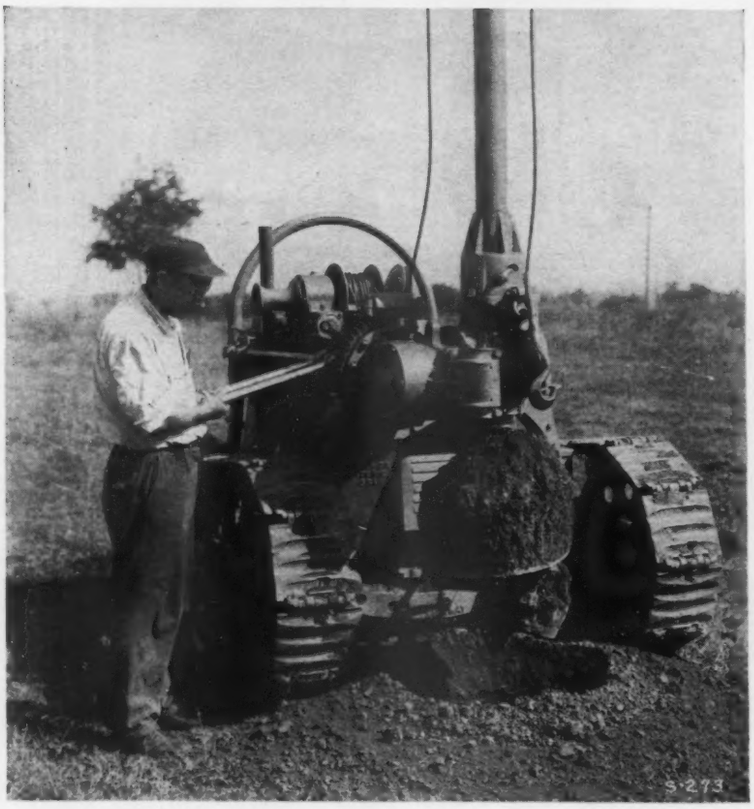
Sales Agent—Distributors

GRAYBAR ELECTRIC COMPANY INC. **GENERAL ELECTRIC SUPPLY CORP.**

MADE AT ORANGEBURG, NEW YORK
BY THE FIBRE CONDUIT COMPANY
292 MADISON AVE., NEW YORK CITY

ORANGEBURG Standard for installation *with* concrete encasement
Nocrete for installation *without* concrete encasement

Highway



HIGHWAY EARTH BORING AND POLE SETTING MACHINES

Build power lines any time at low cost: The Highway reduces the time element in every operation and lightens the amount of manual labor. It adds a higher degree of safety and is of great value in cutting the time for completing new construction programs in any season of the year. With the Highway mounted on truck or tractor you can bore at difficult angles and in hard-to-reach places. There are many types and sizes available.

HIGHWAY WINCHES

• They save costs in time, labor, and maintenance. There is a Winch for every need—even types light enough to use on 1½ and 2-ton trucks. They are easier to use and stay in service. Smooth operation under heavy duty. Read descriptions in our catalog.

HIGHWAY DERRICKS

• Simple to use. High factor of safety. Size and capacity for any height and weight of pole. Dependability under all conditions insures savings in costs. Fully described in catalog and literature.

HIGHWAY TRAILER CO.
EDGERTON WISCONSIN

award. He is a member of the American Association for the Advancement of Science and the A.I.E.E., where he serves on the membership, publication and technical programs committees. He has produced several inventions in the electrical field and is author of many technical papers delivered before the A.I.E.E. and other technical and professional societies.

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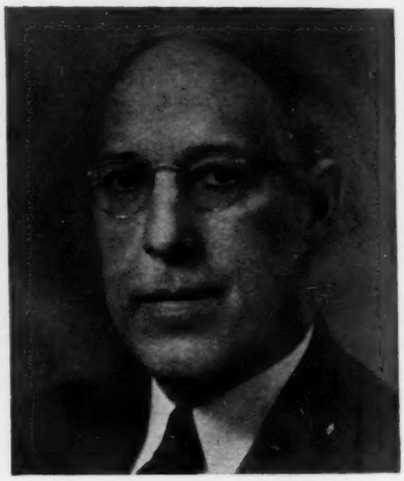
E. W. Brown Vice-President of Two Utility Companies

Edward W. Brown was elected vice-president of the Kentucky Utilities Co. and the Old Dominion Power Co. by the directors at their recent annual



meeting. This promotion comes as recognition of Mr. Brown's service with the organization during the last 22 years.

Since 1935 Mr. Brown has been director of operations for the Kentucky Utilities system. Prior to that time he was chief engineer for eight years. His connection with the organization began when he became chief engineer of the Pocket generating station of the Electric Transmission Co. of Virginia (now the Old Dominion Power Co.) in 1917.

Mr. Brown was promoted to Mountain Division engineer and transferred to Pineville, Ky., in 1921. He joined the general office executive staff in 1927. In 1933 he became a director of the Old Dominion Power Co. and of Old Dominion Ice Corp., and two years later was elected a director of Kentucky Utilities Co.

•

▶ DR. FRANK B. JEWETT, president of the Bell Telephone Laboratories, has been elected president of the National Academy of Sciences.

▶ W. S. KIRKPATRICK, formerly distributor for Brunswick-Kroeschell Co. and Carrier Corp., has been appointed by International Standard Electric Corp., I. T. & T. subsidiary, to manage its

GENERAL CABLE

TRENCHLAY*

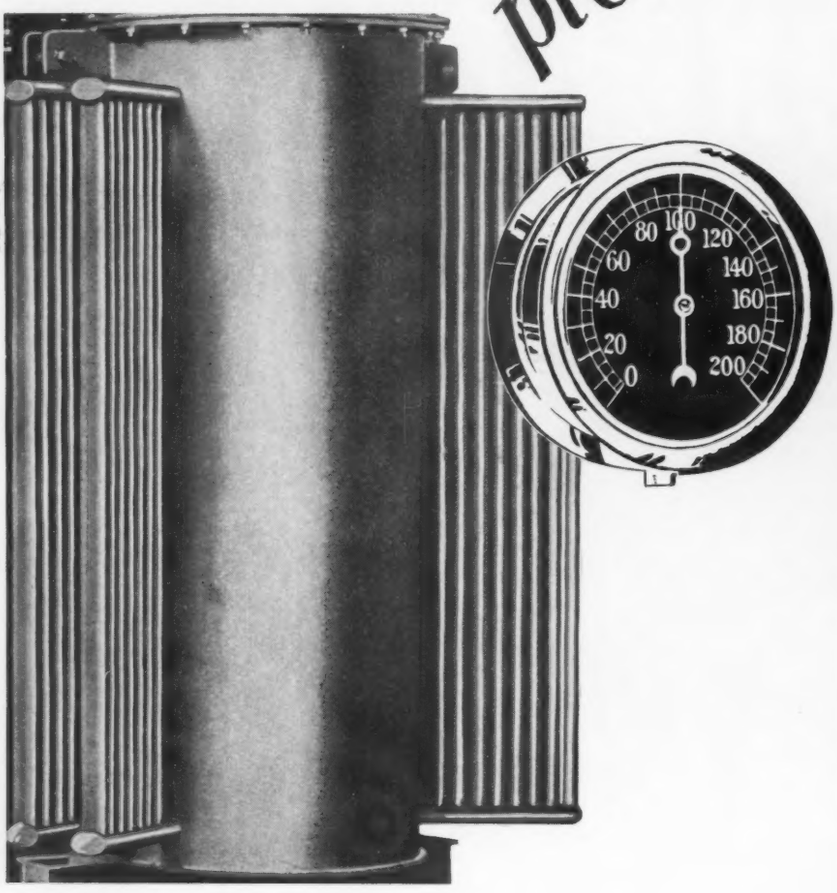
Specify and insist on Trenchlay to assure the benefit of the long experience of the pioneers in non-metallic armored cables for direct-earth installation.

*Trade-Mark

GENERAL CABLE

General Cable Corporation Sales Offices: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT
KANSAS CITY (MO.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROME (N. Y.) • ST. LOUIS • SAN FRANCISCO • SEATTLE • WASHINGTON (D. C.)

Radiators tested at 100 lbs. pressure



YOU will appreciate the durability and strength of Pennsylvania Radiators when you consider that every one is tested at 100-pounds pressure! Such sturdy construction provides a positive solution to your radiator problem and is but one of many Pennsylvania improvements offered without additional cost to the user!

A DECADE OF PROGRESS IN BUILDING TRANSFORMERS
1929 PENNSYLVANIA TRANSFORMERS 1939

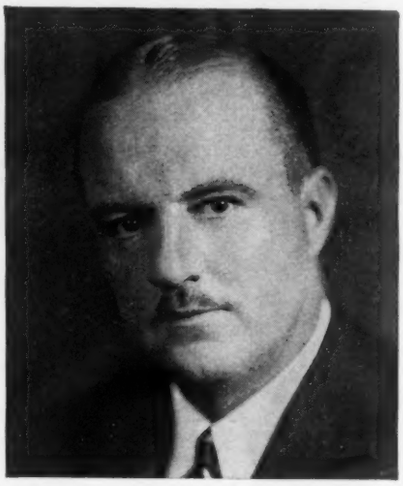
Pennsylvania
TRANSFORMER COMPANY
1701 ISLAND AVENUE, N. S. PITTSBURGH, PA.

sales of electric refrigeration and air conditioning products abroad, principally in the European market. Mr. Kirkpatrick will be supervisor of commercial refrigeration and air conditioning with headquarters in London.

•

A. W. Conover General Manager of Ohio Utility

A. W. Conover, who for the past number of years has been in charge of the Colorado Central Power Company at Golden, Colo., and also the Oklahoma Utilities Company at Bristow, Okla., was recently elected vice-president and general manager of the Central Ohio Light & Power Co., with headquarters at the general office in Findlay.



Mr. Conover will continue on the directorate of the western companies and also will continue to supervise the public relations activities of the properties in the Crescent Public Service group, as well as the East Coast properties.

He has been active in the utility associations in the western part of the country and in 1934 served on the executive committee of the Code Authority.

▪

▶ WALTER E. LONG, vice-president of the United Gas Improvement Co., has been elected a director of the Philadelphia Electric Co. He succeeds Edward Hopkinson, Jr.

▶ W. EARL JULIAN has been appointed sales manager of the Key West Electric Co., Key West, Fla. Mr. Julian, a native of Tennessee, has been connected with the Key West utility for the past thirteen years.

▶ DR. MORTON G. LLOYD, chief of the section of safety codes of the National Bureau of Standards, Washington, D. C., has been elected president of the

A Plus Value of the Kelvinator National Salesmen's Institute . . . To Help You —

Build Good Will with the Public

MORE THAN ever before, personal salesmanship is proving a commanding factor in the public utility business . . . and in more ways than building load.

For in those brief face-to-face contacts between employee and customer is the sole opportunity a large company has to meet its public on a personal basis and make a *personal* impression.

A poor salesman can do more damage than fail to get one individual order; he is a reflection on his company.

Up until now, public utility companies have had to be content with ordinary "sales training" programs which skimmed the surface, or develop their own programs at a prohibitive cost in time and money.

From the background of a long experience with your problems, Kelvinator has developed the National Salesmen's Institute. From the start, it has been watched with eager interest in your field.

Going far beyond the usual routine, it starts with the *fundamentals* of selling and finishes with the latest scientific ways to sell service and product *in daily work*. It fits the salesman in his job, helps him make the most effective use of Kelvinator promotions and material.

The Institute is a separate organization, headed by outstanding leaders in sales education . . . by Sidney Edlund, nationally known for his work in sales training, and as founder of the "Man Marketing Clinic".

There is constant contact with salesmen . . . weekly lessons and records made of them. The Diploma is a "Master's Degree" that covers every phase of appliance selling. The men who win it *know how to sell*—and *how to represent you.*

You can know, with mechanical certainty, that your men are getting the best specialty sales training available today—and at minimum trouble to yourself.

The Institute is ready to work for any retail selling organization handling Kelvinator products. It marks another significant development springing from the "oldest friendship in the industry".

Write for a booklet that will give you the entire story. KELVINATOR, Division of Nash-Kelvinator Corporation, Detroit, Michigan.

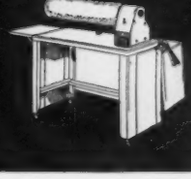
KELVINATOR

The Oldest Maker of Electric Refrigerators

Kelvinator is now showing its Silver Jubilee line of Electric Refrigerators powered by the highly efficient, sealed Polarsphere.

Kelvinator Electric Ranges for 1939—more economical than ever—faster-heating ovens, oversize broilers, two types of high-speed units.

Kelvinator Electric Washers: Fin-Flex Agitator "bends" and flushes dirt out of delicate fabrics. Wringer has automatic Pressure Pilot.



Kelvinator Electric Ironers: to ease you through the family ironing quickly, economically—2,736 square inches of cloth per minute.

New Kelvinator Electric Water Heaters are trim in design, with all plumbing and wiring concealed. They're economical and never-failing.

The COMPLETE Line

Every kind of conductor fitting—for tube, bar, cable, or wire. Every size. More than 6,200 items.

Including many *Improved Fittings* originated by Penn-Union to give you quicker and easier connections, that are *Permanent* and *Dependable.*

Clamp Type Terminals for every size and type conductor. All types—for any application.

Universal Clamp, that takes a wide range of wire sizes.

Most Popular Type of connector, with innumerable uses — the all-around favorite of practically every user of current.

Set-screw connectors for solid and stranded cable.

Figure Eight and **Oval** copper tube sleeves, also split tinned sleeves, etc.

Service Entrance Connectors, with heavy 1-piece hard drawn copper body.

Fuse Clips, Ferrule and Knife - Blade types, spring tempered bronze.

Every Penn-Union Connector is Dependable. Preferred by the leading utility companies and "industrials."

Sold by leading jobbers

PENN-UNION ELECTRIC CORPORATION
ERIE, PA.

PENN-UNION
Conductor Fittings

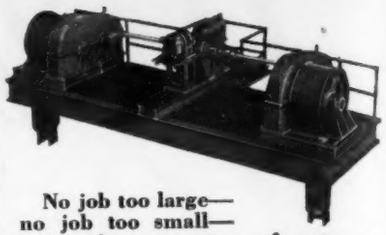
International Association of Electrical Inspectors. A graduate of the University of Pennsylvania, he received the degree of Doctor of Philosophy from that institution, after pursuing graduate studies at Harvard University and in Berlin. For many years Dr. Lloyd was a member of the scientific staff of the bureau during the period of its early development. From 1910 to 1917 he was technical editor of the *Electrical Review and Western Electrician.* In 1917 he returned to the bureau, and upon the resignation of W. J. Canada was put in charge of electrical safety engineering. Dr. Lloyd has been active in the American Institute of Electrical Engineers, of which he is a fellow, and in the Illuminating Engineering Society.

OBITUARY

▶JOHN R. FENNIMAN, treasurer of the Consolidated Edison Co. of New York, Inc., died of a heart attack, at his home in Brooklyn, N. Y., April 21. Mr. Fenniman began his business career with the Brooklyn Union Gas Co. He went to Consolidated Gas Co., predecessor of Consolidated Edison, as a clerk in 1904. He established the first information bureau for the company in its Third Avenue district office. Advancing through the ranks, Mr. Fenniman became assistant general superintendent of the commercial department of the company in 1919. Four years later he was appointed assistant treasurer, and in 1929 became treasurer. He continued in that capacity when mergers of various companies in the group formed the present Consolidated Edison Co.

▶ALBERT G. DAVIS, retired vice-president of the General Electric Co., in charge of patents, died April 25 at his home in New York, in his sixty-eighth year. Mr. Davis, who had been connected with the General Electric Co. for more than 35 years, retired May 1, 1933, to join the law firm of Pennie, Davis, Marvin & Edmonds in New York. Two years ago he left the firm to practice independently. When Mr. Davis took over the management of the General Electric patent department, in 1897, the electrical industry was entering upon its great high tide of pioneer development, a trend which was followed for 25 years. During his time the grist of inventions was enormous and the responsibility of discerning which inventions would be indispensable in years to come was a heavy one. This work was directed by Mr. Davis in behalf of the company with pronounced success. In recognition of his record he was appointed vice-president of the company in 1919.

GATE HOISTS * TO MEET ALL YOUR REQUIREMENTS

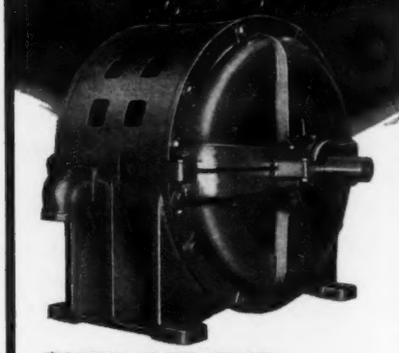


No job too large— no job too small— hoists for any type of gates— motor or hand operated. Capacities—less than 1 ton to over 100 tons. Successful installations made for leading engineers, power companies, industrial plants, all over the country. Backed by over 35 years successful experience designing and manufacturing gate hoists. Your specifications will receive prompt attention from our engineers, who will gladly help you solve your gate hoist problems.

D. J. MURRAY MFG. CO.
Wausau, Wisconsin
Manufacturers since 1883

Murray GATE HOISTS

ELLIOTT MOTORS



THEY GET THE *TOUGH* JOBS

—the kind of service that puts a motor down for the count—unless it's designed with the brains and skill and care that are usual with Elliott built-for-the-job motors. Try one on a balky drive. The bulletin will tell you what to expect—and why. On request.

L-709

ELLIOTT COMPANY
Electric Power Dept. RIDGWAY, PA.
District Offices in Principal Cities
Steam Turbines • Generators • Motors • Blowers
Condensers • Ejectors • Deaerators • Tube Cleaners
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INTERNATIONAL HARVESTER

sells MORE HEAVY-DUTY TRUCKS (2-ton and up) than any other THREE MANUFACTURERS COMBINED

• In ever-increasing numbers, truck users are investing in the truck that bears the Triple-Diamond emblem. They are *cashing in* on the *high-quality standard* maintained for International Trucks during thirty-two years of truck manufacture . . . a quality standard of which every man in the Harvester organization is proud.

Another practical reason for the great demand for International Trucks is the fact that they are backed by the *most complete Company-owned truck service organization.* Whatever your own hauling need, the International dealer or branch near you has the truck for it. Sizes range from ½-ton light-delivery trucks to big 6-wheelers.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 North Michigan Avenue **Chicago, Illinois**

The Northwestern Electric Co., Portland, Ore., uses this International as a line truck. The body was designed by its engineering department. It won second place in the Automotive Bodies division in the contest on "Arc Welding and Its Applications" sponsored by the James F. Lincoln Arc Welding Foundation.

INTERNATIONAL TRUCKS

MANUFACTURING - MARKETS

Westinghouse Shows First Quarter Gain

A gain of 53 per cent in business for the first quarter this year is reported for the merchandising division of Westinghouse Electric & Manufacturing Co. by Frank B. Williams, Jr., vice-president in charge of the division.

"Indications are that the upward trend will continue throughout the year," Mr. Williams declared. "A slight recession may be noted for the summer months, but we believe total business for 1939 will be well ahead of last year's figures."

Mr. Williams stated that advances in air conditioning sales prove this to be a field of steadily expanding business. He predicted that electric kitchens and electric laundries designed for efficiency as part of many new homes today will be standard in the homes of tomorrow.

•

Servel, Inc., Calls Bonds

Board of directors of Servel, Inc., has authorized calling for redemption on July 1 of the company's remaining outstanding first mortgage twenty-year 5 per cent bonds, aggregating $500,670. The redemption price is 105 and accrued interest to the redemption date.

•

Allis-Chalmers to Build New Plant in Pittsburgh

Contracts have been let to build a new transformer plant in Pittsburgh, to be known as the River Plant of the Allis-Chalmers Manufacturing Co., Pittsburgh Works. The plant will be 416 by 144 ft.; will cost, with buildings and equipment, approximately $378,000; and will be put into operation about August 15.

In design, this plant will represent the latest manufacturing methods as applied to the production of distribution transformers. The general contractor awarded this job is H. M. Siesel Construction Co., of Milwaukee and Pittsburgh. Contracts for the steel work go to the Bethlehem Steel Corp.

•

G.E. Makes Five New Radio Appointments

Five new appointments to the radio and television division of the General Electric Co., have been announced by Perry F. Hadlock, newly appointed division manager. All appointments are to key positions in the headquarters operation of the division at Bridgeport, Conn.

Arthur A. Brandt, for the past two years advertising manager for radio, has been appointed manager of merchandising services, involving the direction of merchandising, advertising, and sales promotion of all products of the radio and television division. Fred A. Ray has been appointed manager of radio sales, after serving for six years as district radio sales manager for General Electric, with headquarters in Cleveland and covering the territory made up of Ohio, Michigan, Indiana, and Kentucky. Henry A. Crossland has been appointed G-E's first manager of television sales. Philip R. Butler succeeds Mr. Crossland as manager of technical sales and service for the company. Charles R. Barhydt has been named commercial engineer for radio and television, succeeding Mr. Hadlock.

•

Bids for Turbo-Generator

State Electricity Commission, Melbourne, Australia, will receive bids until June 27 for a 4,000-kw. turbo-generator unit, including condenser, boiler feed equipment, feed-heating and evaporating plant, and auxiliary equipment, for installation in Newport power station.

Refrigerator Sales Again Rise Sharply

Domestic sales of electrical household refrigerators to distributors and dealers during the month of March amounted to 234,044 units, compared with 184,643 units in February and 162,139 units in March, 1938, according to a report issued by the National Electrical Manufacturers Association. For the first quarter domestic sales totaled 558,739 units, compared with 394,726 units in the first quarter of 1938.

World sales in March amounted to 251,895 units, compared with 197,781 units in February and 183,059 units in March, 1938. For the first quarter of 1939 world sales totaled 597,299 units, compared with 438,647 units in the first quarter of 1938.

The figures in these reports, received from seventeen companies, are estimated to include more than 90 per cent of the industry.

•

Vacuum Cleaner Sales Up

Vacuum cleaner sales as reported by the industry for March, 1939, were greatest since May, 1937, totalling 152,255, compared to 112,322 in February and 141,334 in March, 1938, according to figures made public by C. G. Frantz, secretary of the Vacuum Cleaner Manufacturers' Association. March sales, 34.7 per cent ahead of February and 7.7 per cent above the total in March, a year ago, brought the industry first-quarter total to 367,176, compared to 372,798 in the similar period of 1938.

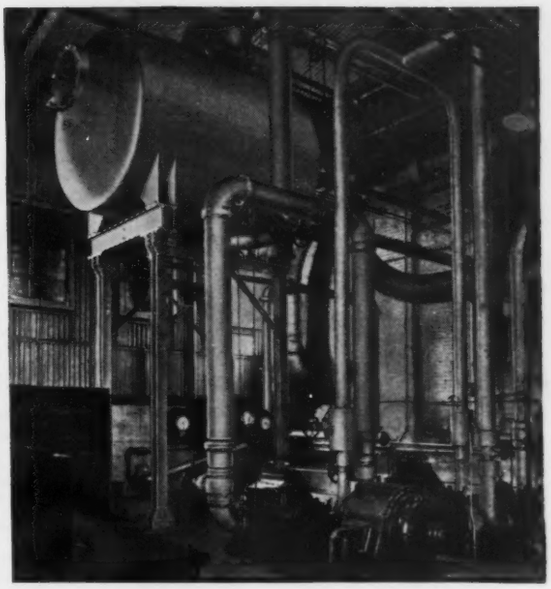
•

Equipment Awards Made for Bonneville System

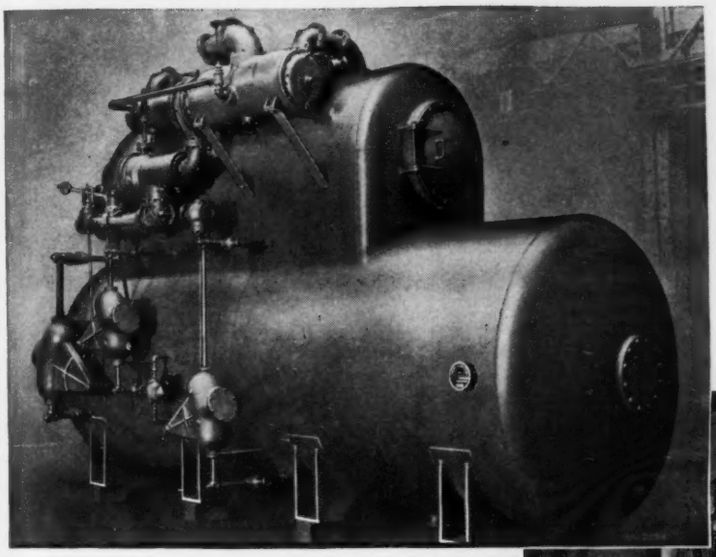
Acting Administrator, Bonneville Project, Portland, Ore., has made the following equipment awards for transmission system installations:

Transformers for power substation

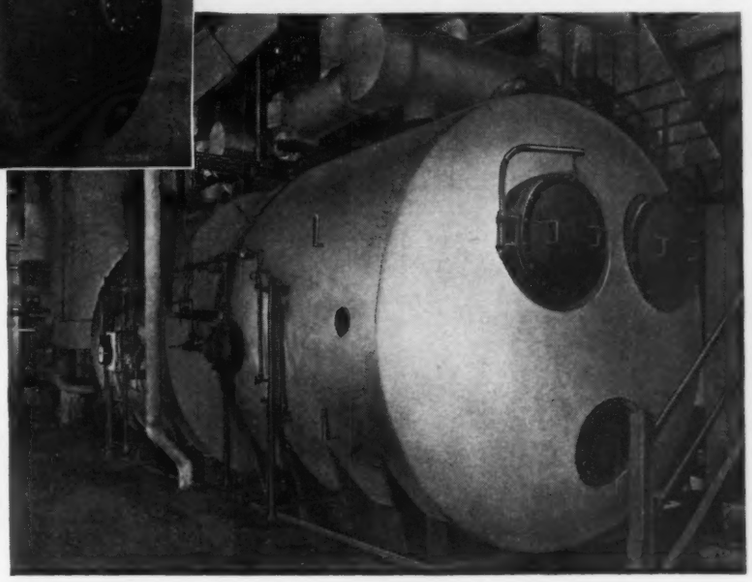
WORTHINGTON DEAERATORS REDUCE FUEL AND MAINTENANCE COST



IN A TEXTILE MILL. *This deaerator is for 176,000 lbs. per hour capacity. Note the two Worthington Centrifugal Boiler Feed Pumps for 550 p. s. i.*



IN A MANUFACTURING PLANT. *A 400,000 lbs. per hour capacity pressure-vacuum type storage unit. 7500 gallons storage capacity*



IN A LARGE CENTRAL STATION. *Two deaerators... capacity of each, 650,000 lbs. per hour*

FROM THE SMALLEST INDUSTRIAL PLANT TO THE LARGEST CENTRAL STATION WORTHINGTON DEAERATORS ARE BUILT TO MEET INDIVIDUAL PLANT REQUIREMENTS FOR LIMITED SPACE AND THE MOST EXACTING SERVICE CONDITIONS

PRODUCTS OF
WORTHINGTON

AIR CONDITIONING EQUIPMENT
REFRIGERATION AND ICE PLANT EQUIPMENT
AIR AND GAS COMPRESSORS
STEAM TURBINES
DIESEL ENGINES
GAS ENGINES
CONVERTIBLE GAS-DIESEL ENGINES
CENTRIFUGAL HIGH-PRESSURE BOILER FEED PUMPS
DIRECT-ACTING STEAM PUMPS POWER AND ROTARY PUMPS
DEEP WELL, SUMP, AND DRAINAGE PUMPS
STEAM CONDENSERS AND AUXILIARIES
VACUUM PUMPS
STEAM-JET EJECTORS
PORTABLE COMPRESSORS AND AIR TOOLS
For street ... trench ... conduit service
V-BELT DRIVES LIQUID METERS

They will cut fuel costs by producing the maximum obtainable feedwater temperature. Further, by removing free oxygen and CO_2 they increase boiler efficiency, reduce boiler cleaning and repairs—and prolong the life of both boiler and piping.

Worthington engineers are available to study your feedwater problems. Get in touch with the nearest Worthington district office . . . today

• • • •

PRESSURE, VACUUM, PRESSURE-VACUUM, METERING, STORAGE
All Types . . . For Any Capacity

SHO-1

WORTHINGTON PUMP AND MACHINERY CORPORATION

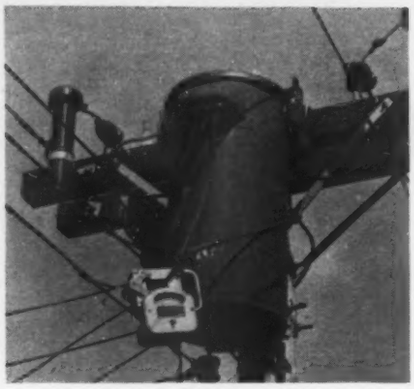
ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND DALLAS DENVER DETROIT EL PASO HOUSTON KANSAS CITY

General Offices: HARRISON, NEW JERSEY

Representatives in Principal Cities of Foreign Countries

LOS ANGELES NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS ST. PAUL SAN FRANCISCO SEATTLE TULSA WASHINGTON

SOON PAYS FOR ITSELF . .



Get Proof of

MAX-I-METER

COST-SAVINGS THROUGH ACTUAL test on your system

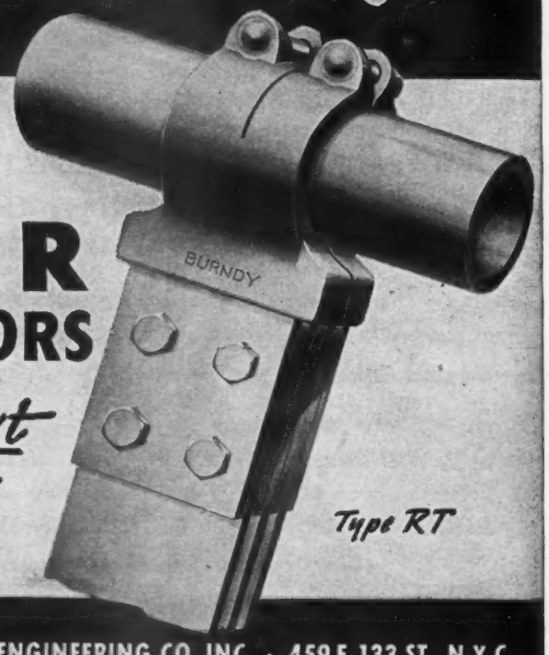
If you are seeking a dependable, low-cost, proved method for checking loading on your distribution transformers, see how the MAX-I-METER answers your need in full. Order one today and try it out—the test will quickly show you the savings you can make.

H D ELECTRIC COMPANY 100 W. MONROE ST., CHICAGO, ILL.

The illustration above shows a MAX-I-METER on the secondary side of a distribution transformer.

HD MAX-I-METER

BURNDY



POWER CONNECTORS

"for your next substation"

Type RT

BURNDY ENGINEERING CO. INC. · 459 E. 133 ST., N.Y.C.

at Kelso, Wash., to Wagner Electric Corp., St. Louis, Mo., at $33,891.

Metalclad switchgear, to Westinghouse Electric & Manufacturing Co., at $19,215.

Circuit breakers, to General Electric Co., at $15,390.

•

Manufacturers Issue Quarterly Reports

Several electrical manufacturing companies have issued corporate reports for the first quarter of 1939:

SQUARE D—Net profit $120,600 after depreciation, federal income taxes, etc., equal to 35 cents a share on 343,860 shares of common stock. This compares with $65,641 or 19 cents a share in March quarter of previous year.

ANACONDA WIRE & CABLE—Net loss, $77,161, after interest, depreciation, federal income taxes and other charges, compared with net loss of $309,790 in the March quarter of 1938.

GENERAL CABLE—Net loss, $196,773, against $66,147 last year.

WORTHINGTON PUMP—While the lower rate of production for the first quarter of 1939 resulted in an operating loss, the rate of new orders booked since the first of the year shows an increase of 30 per cent over the similar period of last year, it was announced at the recent annual meeting in Wilmington, Del. A substantial gain in backlog of unfilled orders was reported.

OKONITE—For 1938: Net loss, $205,483, contrasted with net income of $538,527, equal, after preferred dividends to $39.96 each on 12,000 common shares in 1937.

•

Manufacturers' Sales Show 15% Gain in First Quarter

Manufacturers' sales of electrical machinery, apparatus and supplies during the first quarter, as reported by 92 firms, were valued at $64,790,000, a gain of 15 per cent over the corresponding period a year ago, according to the Department of Commerce. For all industries reporting, manufacturers' sales were valued at $925,849,000, a gain of 10.3 per cent over the first quarter of 1938.

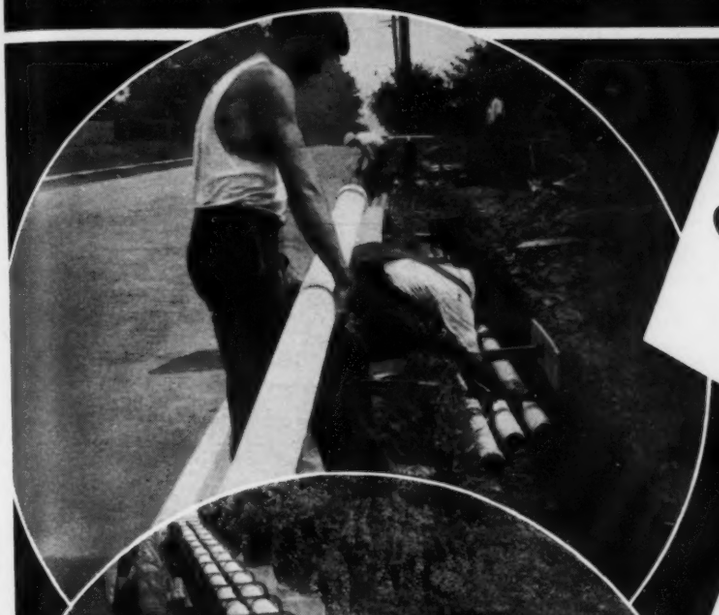
Manufacturers' sales of electrical machinery, apparatus and supplies during March were valued at $23,173,000, a gain of 13 per cent over February and of 16.1 per cent over March last year. These gains compare with gains of 16.6 per cent over February and of 9.9 per cent for March last year, for all the industries reporting.

New York Metal Prices

	May 2, 1939 Cents per Pound	Apr. 26, 1939 Cents per Pound
Copper electrolytic	10.25*	10.00*
Lead Am. S. & R. price	4.75	4.75
Antimony	11.50	11.25
Nickel ingot	35.00	35.00
Zinc spots	4.89	4.89
Tin Straits	49.25	48.25
Aluminum, 99 per cent.	20.00	20.00

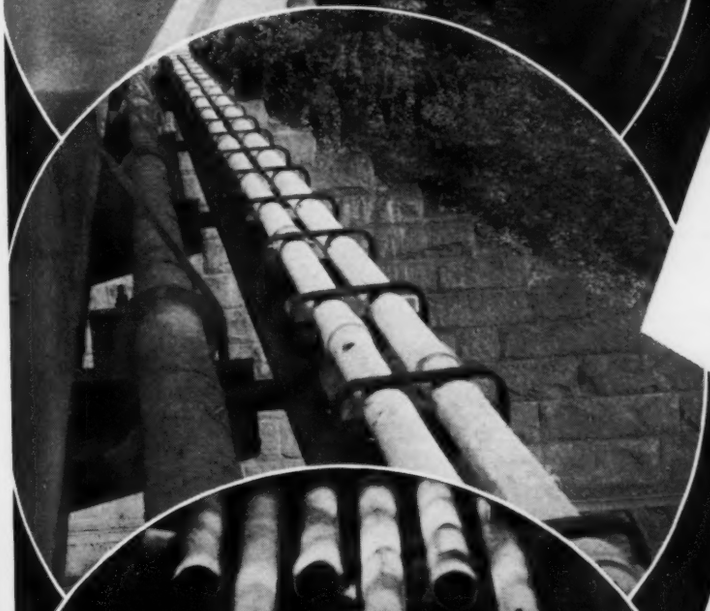
*Delivered Connecticut Valley.

THIS DURABLE CONDUIT



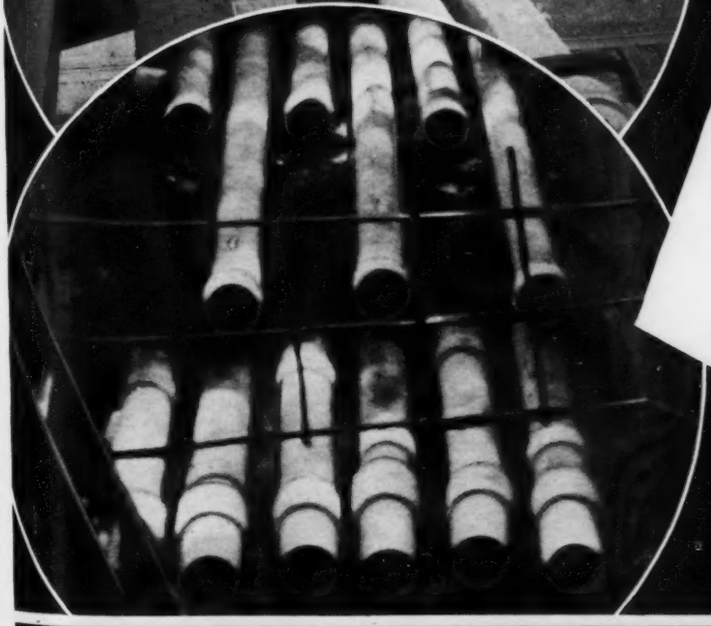
COSTS LESS TO INSTALL

Uniformly strong and durable, J-M Transite Conduit retains its true form under sustained loads—requires no concrete envelope underground or in exposed locations. Its long light lengths are easily handled, rapidly installed.



COSTS LESS TO MAINTAIN

Made of asbestos and cement, Transite Conduit is highly resistant to smoke, acid fumes, weather and corrosive soils. It will not rust, rot or decay, is completely incombustible, offers unusual resistance to flame and arc. Maintenance costs are kept to a minimum.

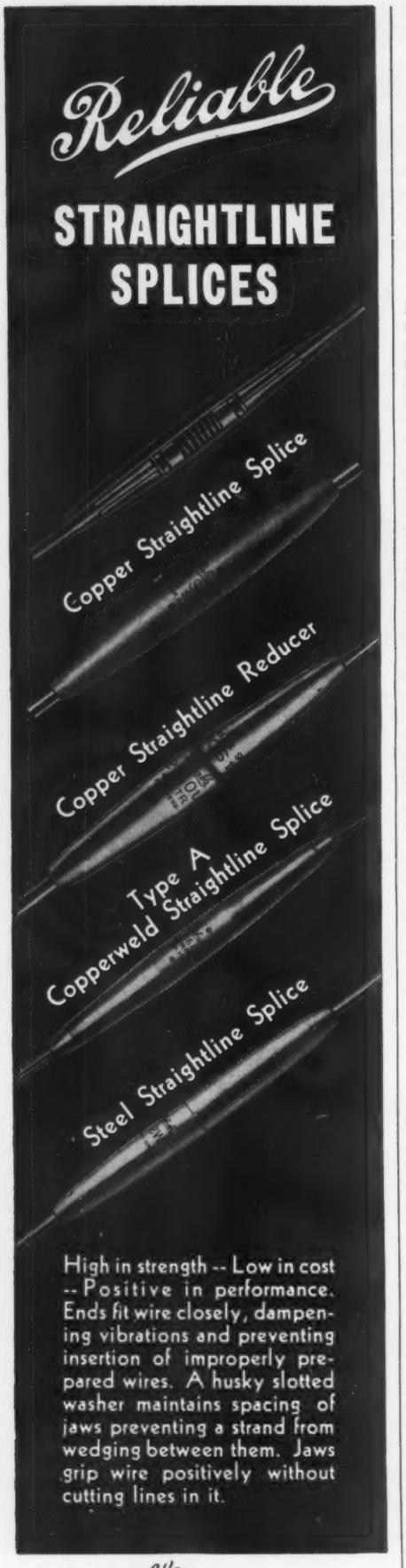


RETAINS ITS SMOOTH BORE

The original smooth interior of Transite Conduit *stays* smooth in service. Joints are tight and snug—free from jagged obstructions. Therefore, cable pulling is easier—long pulls may be made without injuring the sheath—cables can be easily removed.

You should have complete information about Transite Conduit and its thinner-walled companion product, J-M Transite Korduct. Write for Brochure DS-410. Johns-Manville, 22 East 40th Street, New York, N.Y.

Johns-Manville TRANSITE CONDUIT


Reliable
STRAIGHTLINE SPLICES
Copper Straightline Splice
Copper Straightline Reducer
Type A Copperweld Straightline Splice
Steel Straightline Splice
High in strength -- Low in cost -- Positive in performance. Ends fit wire closely, dampening vibrations and preventing insertion of improperly prepared wires. A husky slotted washer maintains spacing of jaws preventing a strand from wedging between them. Jaws grip wire positively without cutting lines in it.
Reliable
ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE • CHICAGO ILLINOIS

Field Reports on Business

Electrical equipment orders are showing expansion with prospects that volume for the first six months will be greater than the 1938 period. Utilities are going ahead with construction programs and expanding facilities. Household electrical equipment sales continue upward. More optimism is indicated in retail circles.

NEW ENGLAND

Among the interesting orders received in this district recently was a 3,000-kva. transformer purchased by a New England utility. Small motor sales are steady; in the neighborhood of 200 motors aggregating approximately 500 hp. have been bought by a Massachusetts textile plant. A leading Boston hotel has placed an order for a 125-kw. motor-generator set.

Air-conditioning is growing rapidly in the Boston Edison territory. Recent sales bring total installations to 16,000 hp., including more than 100 restaurants, besides office, stores and factory jobs. Sales of electric kitchen equipment aggregating $25,000 were noted at the recent Boston hotel show, a gain of more than $5,000 as compared with last year. Electric refrigerators are moving ahead at a good rate in the Boston area, where more than a carload per week is being apportioned among retailers.

Public Service Co. of New Hampshire in a recent report states that 101.2 miles of new rural lines were constructed, adding 450 rural customers. During the past year this company sold approximately 2,724 refrigerators, both domestic and commercial types; 1,220 electric ranges, 311 water heaters, 307 ironers and 852 washers.

The high volume of new construction permits issued during the past month in the Boston area indicates an encouraging outlook for wiring supplies. The B. F. Sturtevant Company, Hyde Park, announce industrial orders for the first quarter up 48 per cent over 1938. This company reports a large volume of varied and small orders.

PACIFIC COAST

Los Angeles, with $19,410,682 value in building permits, ran second to New York, $61,356,084, for the first quarter of 1939. California shows a slight employment gain over last year, but particularly significant is that shipbuilding employment is up one-third and the movie industry is up 20 per cent over last year. Probably 30 new theatres are under construction in all parts of the state and Paramount is planning a $12,000,000 plant to be completed within five years on a 150-acre site near Los Angeles. New school construction has temporarily slackened off to smaller structures, but many college units are projected.

Recent orders have included $17.040 for poles, sizes 25 to 55 ft., and 600.000 ft. guy strand for Los Angeles; $93,131 for eight De'ta-Star Co. disconnect switches and $19,217 for a smaller group of Pacific Electric disconnects for Los Angeles new Boulder line; $34.200 for Moloney transformers and $30,000 for poles and crossarms for El Centro distribution lines of Imperial Valley irrigation district, and a $48,700 low bid for a 7,500-kva. condenser for Bonneville, which is also in the market for approximately $75,000 poles, mainly 55 ft., for various Seattle and Portland extensions. Contractors and wholesalers report excellent lighting business, rising as high as 48 per cent of items handled, and satisfactory results from such unofficial campaigning as efforts to improve school lighting.

NEW YORK

The opening of the World's Fair here has stimulated retail business. Merchants are preparing for a substantially higher volume of trade during the summer. Weather conditions have been more favorable and is being reflected in sales.

The spring moving season has opened, with changes estimated at 10 per cent above a year ago. The influx of executives and employees of concerns exhibiting at the fair has filled up many homes and apartments.

Business of electrical manufacturers continues to show expansion in many lines. Some industrial equipment is moving. Recent orders for line material indicates the utilities are pushing forward with construction programs. Worthington Pump & Machinery Corp. reports new orders booked since the first of the year show an increase of 30 per cent over the like 1938 period. Unfilled orders are substantially higher than at the beginning of the year.

Utilities are pushing electric range sales with good results. Refrigerators are in demand with sales of water heaters expected to show a good increase with the coming of summer.

CHICAGO

A tone of uncertainty continued to dominate business conditions in general, resulting in a disposition on the part of many industries to mark time pending the removal of existing obstacles to a resumption of recovery. On the whole this feeling has tended to slow-up activity in many lines which, during the first quarter, were making steady progress forward. However, despite this almost pessimistic note, satisfaction is expressed over the potential demand steadily accumulating for products of all kinds as the scant inventories are gradually reduced.

Considerable encouragement was derived by favorable reports received from some quarters. Electrical power output increased slightly over the previous week and steel production in this district held steady, a few points above the national average. Mail order houses registered a new high sales volume, increasing 22 per cent over a year ago. Residential building continued to expand moderately and retail trade showed a gain of 4 per cent over the same period last year.

Orders for electrical equipment held fairly even with the outlook for the next several months quite encouraging. One large industrial plant expects to spend $500,000 for new electrical equipment and has 120 men on electrical work as compared with 43 a year ago. Bids have been asked on 60,000 ft., 5,000 v. rubber insulated lead sheathed cable and 30,000 lbs. number 6 weatherproof line wire. Another company will install motors, control apparatus, regulators, electric hoists and cranes to cost approximately $160,000.

"I Knew Your Father—"

—and in these words, is an expression of confidence and trust. . . . In the field of heating-element wire, Chromel likewise has a good name. The users of Chromel have long since come to know it as dependable on all counts: clean wire, uniform in resistance, wire that is well spooled—and of course, noted for its uniformly high durability.

The reputation of electrical trade-names, of priceless value, has been confidently entrusted to Chromel, over a stretch of thirty years. And Chromel has never let them down. . . . Whatever your interest in electric heat, your judgment is sound when you specify Chromel for the elements. . . . Hoskins Manufacturing Company — Detroit, Michigan.

The Wire That Made Electric Heat Possible

CHROMEL *Wire*

A GOOD NAME IN HEATING ELEMENT

No. 201 N. E. Klein Side Cutting Plier. "Streamlined" for use in confined spaces.

Good workmen demand good tools. In the hands of men who know — everywhere — the pliers are invariably Kleins. Only the keen, hand-honed, perfectly matched cutting knives of Klein Pliers — only the comfortable spring grip in the Klein handles — only the general all around quality that is an inherent part of every Klein Plier can satisfy men whose work demands the best in tools. This, perhaps, explains why Klein Pliers are the standard of quality by which others are judged — why the name Klein has stood for maximum quality, "since 1857."

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

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The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ **Safety for the Pole Climber.**
- ☐ **Specifications on Linemen's Belts and Safety Straps.**
- ☐ **The Safety Factor on Linemen's Leather Goods.**
- ☐ **Pocket Tool Guide.**

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.

3200 BELMONT AVENUE

Sales Opportunities

RICHMOND, IND.—Is considering extensions and improvements in municipal electric power plant, including installation of new 15,000-kw. turbo-generator unit and auxiliary equipment. Estimates of cost will be made by W. R. Stevens, superintendent at station.

DENVER, COLO.—Bureau of Reclamation, Denver, receives bids until May 15 for two 115,000-hp., vertical shaft hydraulic turbines, with two oil-pressure actuator type governors and auxiliary equipment for installation in Boulder power plant, Boulder Canyon project, Arizona-California-Nevada. Equipment will be installed by Government (Specifications 835).

LOS ANGELES, CALIF.—Paramount Pictures, Inc., Paramount Building, New York, N. Y., plans installation of transformers, switchgear and other power substation equipment, motors and controls, regulators, standard and special lighting equipment and other electrical facilities at new motion picture studio on site in Southwestern part of Los Angeles, where company has acquired a tract of 150 acres of land bounded by Pico and National Boulevards, Kelton and Overland Streets. The area will be named Paramount City. Extensive group of buildings will be erected, including 20 or more sound stages. Cost estimated over $10,000,000. Proposed to begin work on project this summer. Local offices of company are at 5451 Marathon Street, Hollywood, Los Angeles.

KNOXVILLE, TENN.—Director of Purchases, Tennessee Valley Authority, Knoxville, receives bids until May 10 for main control switchboards for installation at Hiwassee hydro-electric power station.

NORWALK, OHIO—Has plans under way for extensions and improvements in municipal electric power plant, including installation of additional equipment. Cost estimated close to $100,000. William C. Saladin, director of city service, is in charge.

INDIANAPOLIS, IND.—Central Indiana Power Company, Indianapolis, has approved plans for extensions in primary and secondary lines for rural electrification in parts of Hamilton, Howard, Tipton, Miami, Carroll, Cass, Grant, Clinton, Madison and Marion Counties, totaling about 550 miles, with power substation and service facilities. Work is scheduled to begin this spring.

MERIDEN, CONN.—Chandler-Evans Corporation, 2200 Eighth Street, Detroit, Mich., manufacturer of aircraft and diesel engine equipment, including carburetors, fuel pumps, etc., plans installation of motors and controls, conveyors, electric hoists and other equipment in new plant near Martin airport, Meriden, where tract of five acres of land has been acquired. Proposed to begin work soon. Cost reported over $175,000.

HUNTINGTON, W. VA.—American Rolling Mills Company, Middletown, Ohio, plans installation of motors and controls, conveyors, electric hoists, loaders and other equipment in new coal-handling plant and tipple, to be located on Ohio River waterfront, between First and Third Streets, Huntington, where site has been acquired. Cost about $350,000. Work will begin at early date.

PORTLAND, ORE.—Acting Administrator, Bonneville Project, Department of Interior, Portland, receives bids until May 10 for approximately 22,000 pounds of bare wire and cable (Circular 273); also, until May 12, for twelve potential transformers for power substations of Bonneville transmission system at Eugene and Hood River, Ore., and Kelso and Raymond, Wash. (Circular 270); and, until May 15, for three current limiting reactors for power substation at North Vancouver, Wash., of Bonneville transmission system (Circular 276).

ROCK SPRINGS, WYO.—Union Pacific Coal Company, Omaha, Neb., has plans maturing for new steam-electric generating plant at mining properties in vicinity of Rock Springs, with installation of boilers and accessories, turbo-generator units and auxiliary equipment. Cost reported over $400,000. It is proposed to carry out work this summer.

PENSACOLA, FLA.—Bureau of Yards and Docks, Navy Department, will prepare plans soon for additional buildings and facilities at naval air station, Pensacola, to include expansion in power, lighting and other electrical installation, electrical equipment for shop and operating service. Fund of $5,850,000 is being arranged. Plans also will be prepared for new naval air base at Jacksonville, Fla., and seaplane base on Banana River, Fla., with similar electrical facilities, including power plants. An appropriation of $17,000,000 is being made available for the two latter projects.

OMAHA, NEB.—Nebraska Power Company, Omaha, will make extensions in primary and secondary lines in parts of Saunders and Douglas Counties for rural electric system. Permission has been secured and work will proceed at early date.

GERING, NEB.—Bureau of Reclamation, Denver, Colo., receives bids until May 11 for three 2000-kva. single-phase, 60-cycle, 63,510-110,000 Y-volt to 19,920-34,500 Y-volt, oil-immersed, self-cooled, outdoor-type transformers; and for three 2000-kva. similar transformers, 34,500-6,900-volt, all for installation in power substation at Gering, Kendrick, Wyo. project. Equipment will be installed by Government (Specifications 1224-D).

BERLIN, N. H.—Brown Company, Berlin, plans installation of motors and controls, conveyors, regulators, electric hoists, loaders and other equipment for modernization and improvements in local pulp and paper mill. Company is concluding arrangements with Reconstruction Finance Corporation, Washington, D. C., for loan of $9,000,000, of which approximately $2,000,000 will be used for mill developments noted.

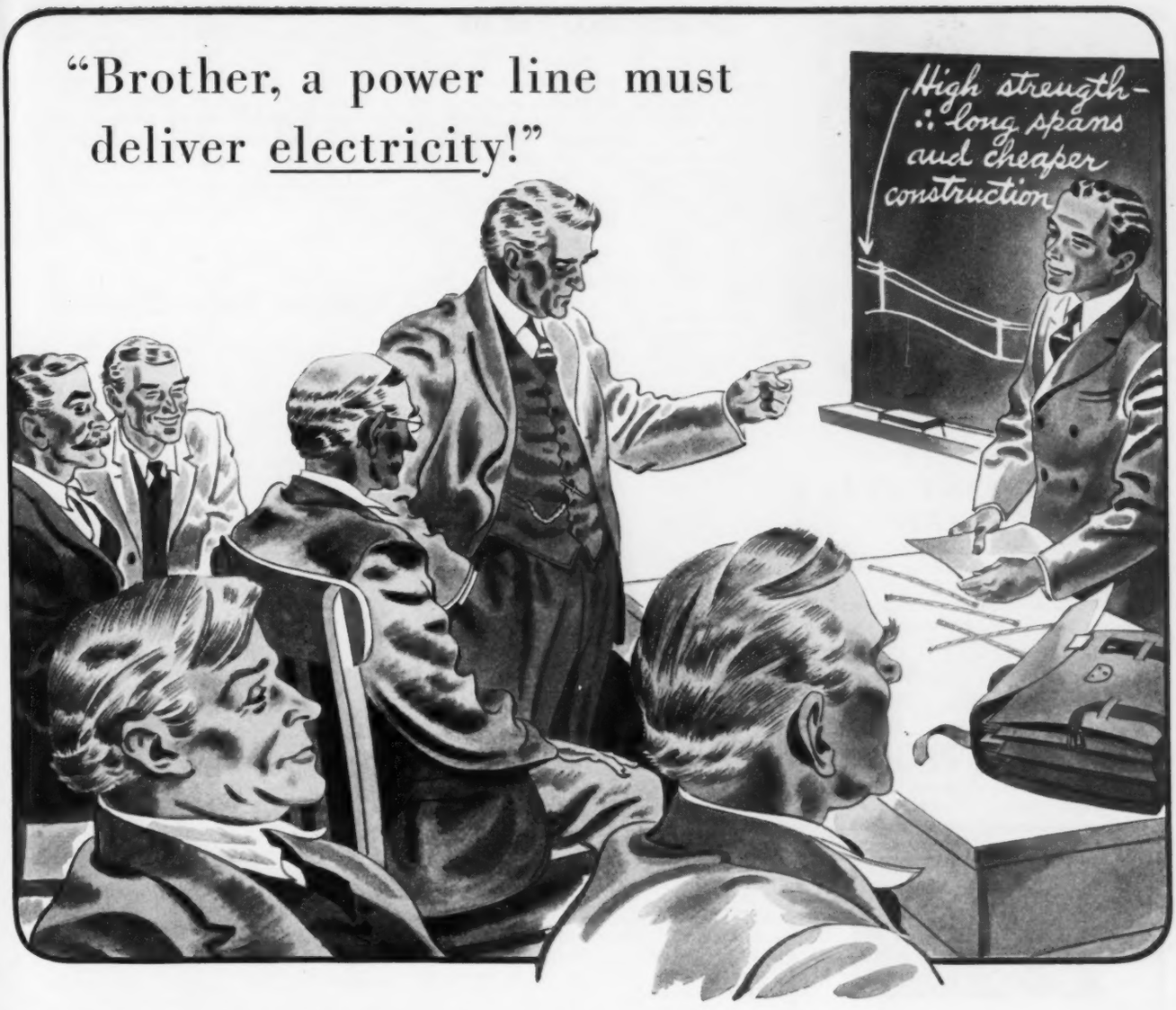
PORTLAND, ORE.—Acting Administrator, Bonneville Project, Department of Interior, Portland, receives bids until May 17 for quantity of current transformers for all power substations of the Bonneville transmission system (Circular 280).

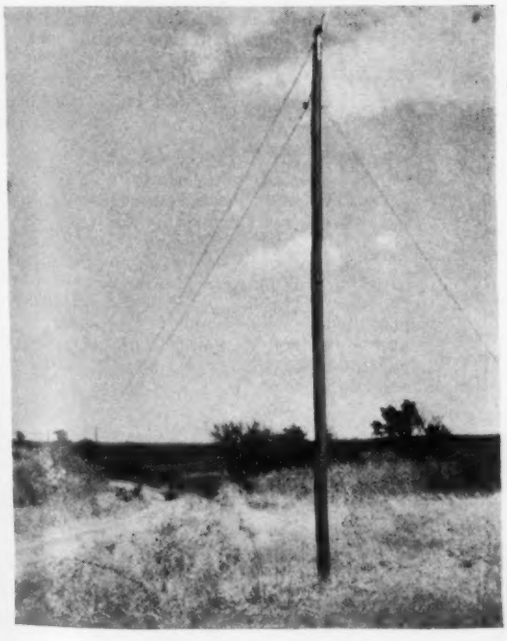
KENEDY, TEX.—Has preliminary plans for municipal electric distribution system, with power substation facilities. Estimates of cost are being made.

MONTEZUMA, IOWA—Has authorized a bond issue of $136,000 at special election, to be used for new municipal electric power plant. Plans will be drawn soon.

FORT WORTH, TEX.—Cosden Petroleum Corporation, Fort Worth, plans installation of motors and controls, compressors, conveyors, electric pumping machinery and other equipment in new oil refining plant in oil field area in Young County, Tex., and for expansion and improvements in present refinery at Big Spring, Tex. Entire project will cost close to $500,000.

"Brother, a power line must deliver electricity!"





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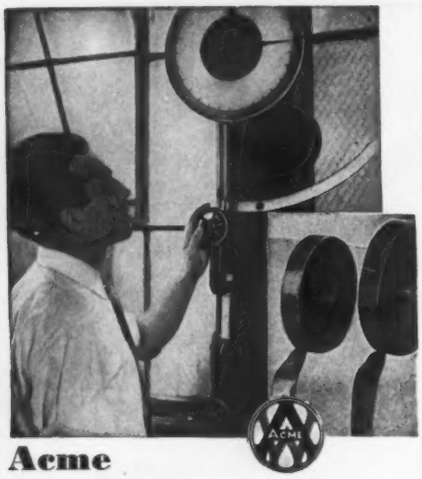

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Municipal Plants

NEWCASTLE, IND.—Judge John H. Morris has announced that he will disqualify himself as judge in the injunction suit of the Public Service Co. of Indiana against the city, which is planning to establish a municipal light plant. Judge Morris is a former Mayor of Newcastle.

BELLEVUE, OHIO—Toledo Edison Co. and the Ohio Public Service Co. have asked Sandusky County Common Pleas Court to issue an injunction against condemnation proceedings in Huron County Common Pleas Court under which the city would take over operation of the power distribution system in Bellevue owned by Toledo Edison. The dispute is four years old. City Council last year offered $115,000 for the distribution system, and proposed then to buy its power wholesale from the companies. The utilities rejected the offer, and proposed rate reductions instead. These were refused by Bellevue, which started the condemnation proceedings against which the utilities seek a permanent injunction. The power companies contend that the condemnation proceedings are illegal under Ohio's laws and that the Huron County court cannot legally act on the case. The distribution system, originally owned by the Lake Erie Power & Light Co., was sold to Toledo Edison, and operation then went to the Ohio Public Service Co. Both are subsidiaries of Cities Service.

NORTH BALTIMORE, OHIO—Village Council has decided to offer the Central Ohio Light & Power Co. $54,700 for its holdings in this village, nearly double the original offer of $27,090, which was recommended by the council's engineer. The higher figure was set by Harold L. Ickes, PWA Administrator, as a fair value of the company's distribution system.

MASSILLON, OHIO—Massillon Trades and Labor Assembly has voted to urge city council to appropriate $6,500 to conduct a survey to determine the cost of erection and maintenance of a municipal power system. The William C. Kammerer Co. of Cleveland offered to make the survey. City council is studying a proposed franchise-ordinance between the city and the Ohio Public Service Co., which would give free street lighting to the city and liquidate its present debt to the company over a ten-year period. The city has at present no franchise with the company, a franchise-ordinance passed by council more than a year ago having been defeated by a referendum vote.

LAGRANGE, TEX.—By an overwhelming majority citizens defeated at a recent election proposed bond issues for the purpose of installing and operating municipal utilities. Revenue bonds in the amount of $145,000 were proposed for a city-wide electric system and similar bonds amounting to $75,000 were proposed for municipal operation of the water system. The vote was 223 against and 15 for on the electric bonds, and 222 against and 15 for on the water bonds. Texas Public Service Co. furnishes utility service. The proposed municipal electric system would have received power from the Lower Colorado River Authority. Voters expressed themselves as opposed to any project which would create new bonded debt.

BARBOURVILLE, KY.—City has taken over under municipal ownership the electric plant of Kentucky-West Virginia Utilities Co. The electric plant will be conducted by a commission consisting of Dr. B. P. Jones, J. M. Wilson and Charles Jennings. J. R. Wharton, formerly manager for the utility company, has been retained as manager for the municipal plant.

SOMERVILLE, MASS.—Bill to permit the city through vote of its aldermen to set up its own municipal lighting plant was killed by the state House with a vote of 108 to 87.

EAGLE LAKE, TEX.—Citizens have rejected a municipal electric system proposal recently by a vote of 247 against and 49 for.

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Recent Rate Changes

VIRGINIA ELECTRIC & POWER CO. will reduce its rates approximately $373,000 a year, effective May 1, according to an announcement of the state Corporation Commission. Of the $373,000, residential and boarding house customers will save $142,500 and commercial and industrial users, municipalities, counties and the State the remaining $230,500. The commission announced that the reductions were the result of negotiations with officials of the power company.

NEW YORK POWER & LIGHT CORP. has been authorized by the state Public Service Commission to revise its residential and commercial electric rates in the city of Oneida, villages of Canastota, Munnsville, Wampsville, Oneida Castle, Vernon and surrounding towns in Madison and Oneida counties. Consumers in this area will receive a net saving of $35,100 annually by the changes which the commission has allowed to go into effect. Domestic users will save $12,100 annually and commercial customers will save $23,000 a year.

QUEENS BOROUGH GAS & ELECTRIC CO. has put into effect reduced electric rates, involving annual savings of between $520,000 and $530,000 to customers. The rate reduction was made possible by the company's withdrawal of a court proceeding by which it tried to reverse the commission's order making the new rates effective last January. The company is also required to refund to customers, with interest at 6 per cent, the amounts collected in excess of what would have been paid if the lower rates were effective January 1, as directed by the commission. The refunds will begin May 15 and must be completed by July 1.

EDISON LIGHT & POWER CO., York, Pa., has been ordered by the state Public Utility Commission to place in effect the tariff of temporary rates set up by the commission in its order of November 30, 1937. This tariff is so designed as to effect a savings of $435,000 a year to the company's customers. The order followed closely upon the decision of the U. S. Supreme Court upholding the power of the commission to impose temporary rates upon the York utility.

NEW JERSEY BOARD OF PUBLIC UTILITY COMMISSIONERS has reported that savings of $1,909,453 to utility service consumers in 1938 were effected. Annual reduction in rates last year by electric companies were reported by the board as follows: Public Service Electric & Gas, $1,251,400; New Jersey Power & Light, $282,949; Atlantic City Electric, $262,000; Jersey Central Power & Light, $17,480; South Jersey Power & Light, $8,616; Millville Electric, $7,300, and Rockland Electric, $2,000.

SOUTHEASTERN INDIANA POWER CO., Rushville, has petitioned the state Public

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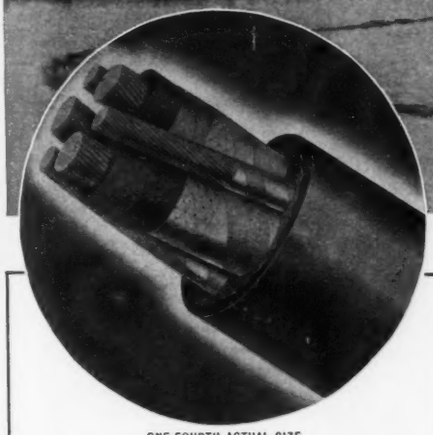

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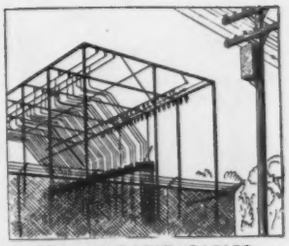

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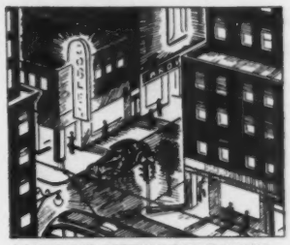

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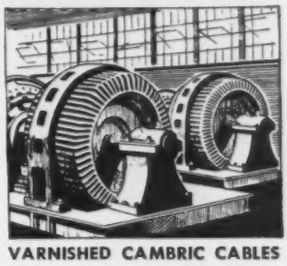

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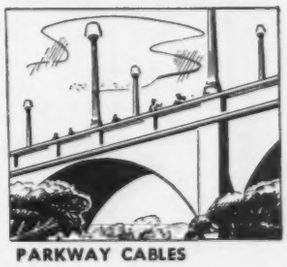

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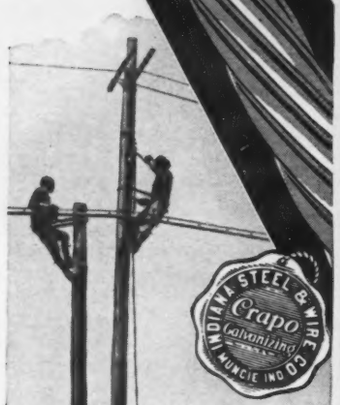

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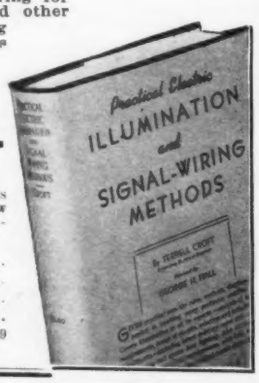

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Service Commission for authority to revise its rate schedule in 53 small towns in that section. The company's petition states that there is no uniformity in the rates in various communities.

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Recent Legislation

Action has been taken on the following legislation affecting the electric light and power industry:

PENNSYLVANIA—An electrical administration board composed of five resident members appointed from recognized groups by the Governor would be created under a bill which has been introduced in the Pennsylvania House. The board would include one representative of an electrical energy supply agency, one electrical contractor, one electrical journeyman, one registered electrical engineer and one insurance group representative. The board would hold regular quarterly meetings and would employ a chief inspector, deputy electrical inspector and other necessary personnel to provide for the inspection of electrical equipment after installation. The board would be empowered to adopt orders, rules and regulations governing electrical equipment and its installation which the board may consider necessary for safeguarding persons and property. The bill provides that no person, firm or corporation shall engage in the business of installing, maintaining, altering or repairing any electrical equipment which comes within the scope of the act unless such person, firm or corporation shall have obtained from the board an electrical contractor's license. A bill fixing the amount of damages a public utility must pay in connection with construction projects has been passed by the Senate by a vote of 40 to 4 and sent to the House. The bill provides that public utilities would be forced to pay the entire costs of improvements if there were no public benefit involved. In the latter event the utility would pay as much of the cost as the benefit derived warranted. The amount of damages that a utility would have to pay, irrespective of costs, would be limited to 15 per cent of the total.

WISCONSIN—A joint resolution has been introduced in the Legislature amending the state Constitution to permit the state to engage in the power business. The measure, which would have to be passed by both houses of this and the next succeeding regular legislative session, and approved by the people at the polls to become effective, stated that the proposal was to recapture and develop the water power of the state "for the purpose of promoting the wider use of electricity in the home and on the farm and to promote industrial development." Another bill introduced in the Assembly would place an annual license fee of 3 per cent on the gross receipts of electric co-operatives in the state. Electric co-operatives now pay only property taxes, which would be replaced by the license fee under the bill. The license fee would be based on the miles of lines owned and operated by each co-operative. The Assembly passed the bill creating a rural electrification co-ordination division in the department of agriculture and markets to co-operate with federal agencies in carrying out a program of rural electrification. The division is to have an annual appropriation of $15,000. The measure now goes to the Senate for action. The White bill to abolish the present state Public Service Commission and create a new commission has been

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introduced in the Senate. Under the measure the present commission with its three commissioners would be abolished and a department of public service created with its head to be named by the Governor.

SOUTH CAROLINA—A measure designed to raise revenue through a revised power tax bill has been introduced in the General Assembly. The proposal would substitute a 6 per cent gross receipts tax on power companies for the half-mill levy on each kilowatt-hour generated within the state. Legislators calculated $1,350,000 would be derived from the revised power tax. The power tax would be put on gross sales rather than the power generated within the state.

MINNESOTA—Under provisions of a labor law passed by the State Legislature which adjourned recently is one providing that the Governor can appoint a commission to investigate a dispute in public service industries, with no strike or lockout permitted pending outcome of the inquiry.

COLORADO—After a long and bitter floor debate, the House recently voted to "table" three bills introduced by Representative James E. Griffith, Democratic floor leader, relating to the control and regulation of public utility companies. One bill proposed to allow the state Public Utilities Commission to supervise relationships between operating utility companies and holding companies; another would empower the utilities commission to charge any utility company a sufficient amount of money to make an appraisal or survey of the company's property, and a third would give the commission supervisory powers over the issuance of securities by utility companies.

TEXAS—Efforts to bring all utilities under regulation by the state railroad commission apparently were killed for the session as a House committee again rejected a regulatory bill by Bryan Bradbury. Representative Bradbury's introduction of the bill some time ago followed decisive action by the committee in rejecting his bill to create a public utilities commission.

MICHIGAN—House of Representatives has adopted, given immediate effect to, and sent to the senate a bill restricting the power of the state Public Service Commission by providing for appeal from its decisions. Heretofore the state supreme court has ruled that appeals must be made direct to that tribunal and confined to issues of law, but the new bill permits appeals to the Ingham County Circuit Court not only on issues of law, but also upon facts.

NEW MEXICO—Governor Miles has signed the REA bill, designed to remove a "joker" from an existing state statute and make possible rural electrification projects in New Mexico under a governmental program.

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Names Research Fellows

Appointment of the second group of five Westinghouse Research Fellows has been announced by the Westinghouse Electric & Manufacturing Co. The first group of five was appointed last year, and all of the group have been reappointed for a second year of fundamental research work at the company's research laboratories in East Pittsburgh.

REA Allotments Now Total $206,954,330

Recent allotments made by the Rural Electrification Administration brought the total made by REA since it was established in 1935 to $206,954,330. Among the allotments are the following:

COLORADO—Morgan County Rural Electric Assn., Fort Morgan, O. S. More, supt., $325,000 to build 193 miles of line, 725 members in Morgan, Weld and Washington counties. Delta-Montrose Rural Power Lines Assn., Delta, Donald S. Mitchell, supt., $179,000 to build 160 miles of line, 530 members in Delta and Montrose counties. Union Rural Electric Assn., Inc., Brighton, Jess R. Rahn, president, $320,000 to build 346 miles of line, 946 members in Boulder, Adams, Jefferson, Gilpin and Weld counties.

INDIANA—Southeastern Indiana REMC, Versailles, D. C. Wilber, president, $200,000 to build 240 miles of line, 720 members in Ripley, Dearborn, Franklin, Ohio, Switzerland, Jefferson, Jennings and Scott counties. Miami-Cass County REMC, Peru, Earl R. Agness, president, $200,000 to build 173 miles of line, 510 members in Miami and Cass counties.

IOWA—S. E. Iowa Co-operative Electric Assn., Mt. Pleasant, Parke F. Cornick, president, $174,000 to build 175 miles of line, 421 members in Henry and Jefferson counties.

MONTANA—Fergus County Co-op. Electric Assn., Lewistown, Howard E. Hall, supt., $130,000 to build 120 miles of line to serve 249 members in Fergus and Judith Basin counties.

NEBRASKA—Thayer County Rural Public Power District, Hebron, J. T. Bright, president, $182,000 to build 172 miles of line, 382 members in Thayer County.

NORTH DAKOTA—Walsh Rural Electric Co-op., Inc., Grafton, N. D., P. J. Donnelly, president, $229,000 to build 225 miles of line, 517 members in Walsh and Pembina counties.

TEXAS—Deaf Smith County Electric Co-op., Inc., Hereford, Henry V. Hennen, supt., $147,000 to build 224 miles of line, 407 members in Deaf Smith, Castro and Parmer counties.

VIRGINIA—Shenandoah Valley Electric Co-op., Harrisonburg, L. E. Long, supt., $100,000 to build 95 miles of line, 300 members in Rockingham, Augusta, Shenandoah, Frederick and Page counties. Southside Electric Co-op., Blackstone, C. G. Hooper, supt., $314,000 to build 401 miles of line, 1,202 members in Amelia, Powhatan, Dinwiddie, Brunswick, Nottoway, Prince Edward, Lunenburg, Cumberland, Mecklenburg, Charlotte and Campbell counties.

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Rise in Power Output

Power output of North American Co. subsidiaries for the first quarter this year showed an increase of 10.5 per cent over the same period last year, James F. Fogarty, president, announced. Mr. Fogarty said that the improvement which began during the latter part of 1938 has continued so far this year.

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We sold this "Megger" Insulation Testing Set in 1913 to a New York Power Co. for the important purpose of detecting moisture and deterioration in electrical equipment. In this 26-year period, the instrument has been serviced only three times—in 1917, 1920 and 1928—at a total cost amounting to only $4.59 per year. Recently, it was returned for a complete overhauling and is now on its way to the half-century mark!

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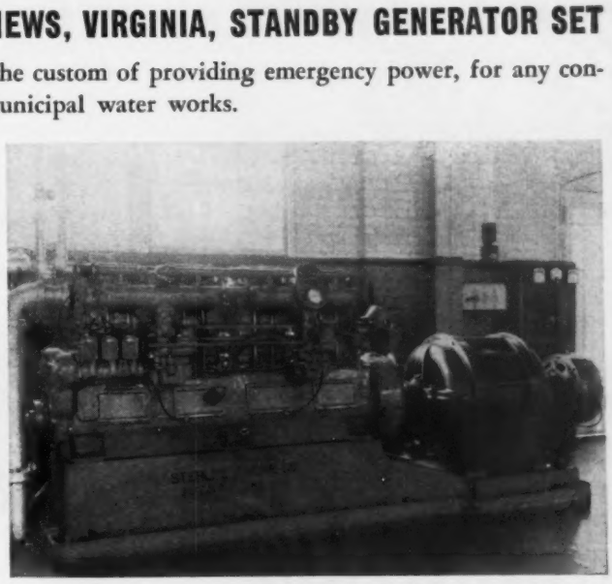
NEWPORT NEWS, VIRGINIA, STANDBY GENERATOR SET

● Typical of the custom of providing emergency power, for any contingency, in municipal water works.

STERLING HIGH DUTY

INTERNAL COMBUSTION ENGINES



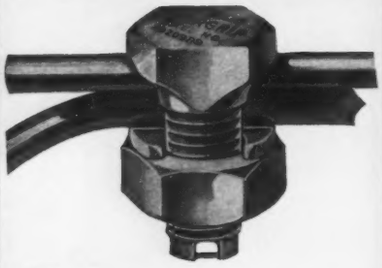
Newport News is equipped with a 200 K.W. Crocker Wheeler Generator 1200 R.P.M. direct driven by Sterling Viking 6-cylinder 425 H.P. gasoline engine.

● Emergency Power is available within a few minutes if these units are manually started—a few seconds, if automatic.

STERLING ENGINE COMPANY

Home Office and Plant, 1270 Niagara Street, Buffalo, New York — Dept. C-2 — Branch Office, 900 Chrysler Bldg., New York, N. Y.

STRENGTH
+
DURABILITY



BLACKBURN Connectors are made completely of high-strength Duronze. Duronze, a silicon bronze actually stronger than steel, is more non-corrosive than pure copper or commercial bronze, commonly used in connectors. It contains no zinc and will not season-crack under the most severe weathering conditions.

for DURABILITY
Specify
BLACKBURN CONNECTORS

JASPER BLACKBURN
PRODUCTS CORP.
Main and Clinton Sts. St. Louis, Mo.

Results!

ARE THE FINAL PROOF

You can use Everstick Anchors with complete confidence in their holding power—safety and long life. Made of Malleable Iron, built to stand the toughest guying service—known and recommended by leading engineers everywhere.

EVERSTICK ANCHORS...

★ EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Coal Handling Demands Reliable Service

[*Continued from page 54*]

handling system is supplied from a 4-kv. station service bus through three-conductor overhead cables terminating in a 4-kv. bus at the yard substation about 400 ft. from the main plant. Power service for the motors is at 575 volts, three phase, two three-phase, 500-kva. transformers being installed at the substation. In general, wiring is in rigid conduit, with the exception of flexible cables at points requiring equipment travel. All electrical equipment is designed to be self-protecting from the dust and moisture encountered in this class of service. The coal tower trolley is of the under-running type and consists of two No. 4/0, figure-eight trolleys per phase. Trolleys are anchored at one end and are strained with movable weights at the other end to maintain an even tension throughout the temperature range encountered. The tower is provided with magnetic brakes, limit switches and automatic rail grip which provide for anchoring the tower in normal operation and prevent over-running of the rail during travel. Four 15-kw., three-phase, 575-volt electric heaters equipped with fans insure operator comfort in the tower.

Tower lighting is provided by a 10-kva. transformer delivering 120-volt energy for this service and located in the tower. To light the hold of the cargo vessel the boom of the hoist is provided with a 1,000-watt special G.E. tubular lamp with reinforced filament, the boom itself being lighted by two 500-watt flood lamps. Around the yard the system is provided with twelve 500-watt flood lamps. Spring supports are used on units subject to severe vibration.

Traveling hopper and crawler crane are supplied with power through flexible cables carried on automatic self-winding reels mounted on the equipment. Cables can be plugged into outlets along the yard conveyor. Plugs and receptacles, of Anderson make, were designed to provide solid ground connections to the movable equipment and have auxiliary contactors which insure the closing of the substation contactor after the main plug contacts have been made and the tripping of the contactor before the main plug contacts are disconnected. The flexible cables are provided with a ground screen between the outside jacket and the conductors for the protection of the men handling the cables.

Conveyor circuits are interlocked to insure proper sequence of starting and operation and auxiliary contacts are provided with all disconnecting switches to eliminate backfeeds to the contactors from interlocking circuits. This has been done in both coal tower and substation. Plug switches for the tower are of 200-amp. rating, those for the traveling hopper being rated at 60 amp. Various details of the wiring scheme of the system are shown in the accompanying sketches.

List of Motors in Lynn Coal-Handling Plant

Service	No.	Hp. Each
Coal Tower		
Hoist	1	*450
Trolley for grab bucket in and out movement	1	*125
Boom hoist	1	* 10
Traversing tower up and down track	2	* 15
Rail clamp	4	1.5
42-in. belt conveyor, tail stacker	1	25
Stacker hoist	1	10
Tail stacker swing	1	5
Stacker feeder motor	1	10
Thrusters	4	0.5
Fan for heaters	4	† 0.25
Other Service		
Motor-generator set	1	5
Conveyor "A"	1	20
Crusher	1	75
Exhauster	1	1
Conveyor "B"	1	15
Conveyor "C" (gas plant supply)	1	20
Conveyor "D"	1	15
Conveyor "E"	1	15
Conveyor "F" (for older boilers)	1	7.5
Traveling hopper	1	5
Crawler crane	1	75
Crawler crane drive for hydraulic control	1	2
Dust collector	1	1
Totals	34	†934

* Slip ring. † Approximate.

Principal equipment suppliers include the following:

Coal tower machinery, McKiernan, Terry Corporation; motors and control, General Electric; Westinghouse De-ion circuit breakers; conveyor systems, Stephens-Adamson; crusher, American Pulverizer; crawler crane, Link-Belt; plugs and receptacles, Anderson; wiring in general, Kerite; hard-service cable, crawler crane wiring, Simplex; traveling hopper, designed by Stone & Webster Engineering Corporation; wharf builder, Rendle Contracting Company; coal tower engineering, Carver Engineering Company.

Boosters Pay Profits on Voltage Regulation

[*Continued from page 46*]

The above dividends were made possible by a capital investment of approximately $400 for a 5-kva. voltage booster.

Another way to accomplish the same results would have been to rebuild this rural feeder to three phase, or increase its voltage from 2,300 to 6,900 volts. The latter plan would probably have been followed had the regulator not been installed.

Increasing the voltage of the regulated portion of this feeder to 6,900 would require new transformers, a booster transformer, reinsulation and a large investment in labor.

This feeder, under consideration, is 2,300 volts, single phase. It is 18 miles in total length and it is 7 miles from the regulator to the last customer. It serves 93 rural customers with a total of 63 transformers. The transformer sizes are as follows: One ½ kva., three 1 kva., three 2 kva., twenty-five 3 kva., eighteen 1½ kva., ten 5 kva., two 7½ kva. and one 10 kva.

The capital investment in material and labor required to rebuild the above line to 6,900 volts would amount to approximately $9,889. The necessity of making this capital investment was eliminated, or delayed, by installing the automatic voltage booster, requiring a capital investment of only $400.

•

Navy Lets Crane Contracts

U. S. Navy has awarded contracts totaling $487,000 for electric overhead traveling bridge cranes at various navy yards. The largest, a $348,212 order, went to the Harnischfeger Corp., Milwaukee, for cranes at the Puget Sound, Boston, Charleston, Brooklyn, Norfolk and Philadelphia yards. Another contract went to Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., for two 175-ton cranes at the Philadelphia yard, $125,000.

•

Refuses Plant Transfer Plea

New York Public Service Commission, by a three to two vote, has denied a petition to transfer the hydroelectric power plant of the Tracey Development Co., located in the village of Waterloo on the Seneca River, to the New York State Electric & Gas Corp.

—you're getting "DIXIE" dense longleaf yellow pine Poles—unsurpassed for uniform strength and durability. Furthermore, you'll find them in exact accordance with your specifications. If they are not for you, why not let us quote on your requirements?

DENSE LONGLEAF PILING, POLES & LUMBER PRESSURE TREATED WITH CREOSOTE OR "WOLMAN SALTS"

"DIXIE" Poles, Piling and Construction lumber . . . . all dense longleaf yellow pine . . . are available untreated or pressure-treated with Creosote or "WOLMAN SALTS" preservative; also pre-fabricated to specification.

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LOCKHART, ALABAMA
A CROSSETT WATZEK GATES INDUSTRY

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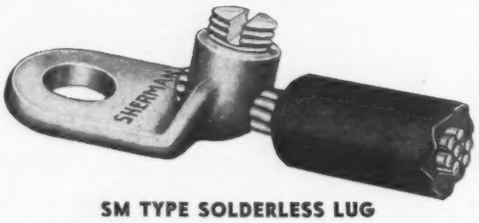
SOLDERLESS LUGS FOR TRUE LUG ECONOMY

Wherever a lug is needed you can select the proper type from the practical, economical Sherman line of Electrical Products. Sherman Solderless Lugs have been designed and manufactured to insure proper electrical and mechanical performance. For true lug economy Sherman is the name to remember. Sold thru Jobbers.

Truly practical and flexible in design — interchangeable with Regular Soldering Lug mountings and can be made to suit peculiarities of equipment design. Easy and quick to use—require no special tools—Heavy Duty design. Send for Bulletin No. 15 for superior performance.



SM TYPE SOLDERLESS LUG

Inexpensive one-piece design and because of small size can be used in places where other lugs are too bulky. Rigid assembly—wire can't shake loose—compact—no special tools required. Screw can be removed and solder dropped in if desired. Direct contact insures highest conductivity. Send for Bulletin No. 24.

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Battle Creek, Michigan

ELECTRITE

A high grade fibre board for electrical insulation. A material of quality possessing high tensile and dielectric strength. Used by many of the leading manufacturers of electrical equipment.

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An extremely hard board of superior quality which can replace the more expensive types of insulating materials.

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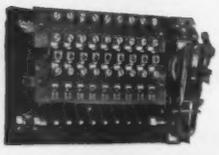


Put your problems up to
STRUTHERS DUNN, INC.
142 N. Juniper St.
Philadelphia, Pa.

Manufacturing Specialists of "Tailor Made" Electrical Control Equipment

How One REA Co-operative Is Working Out

[*Continued from page 49*]

"This lack of earning power is due wholly to the 'thin' character of this rural business. The property has been efficiently managed. The gross earnings are as large and the operating expenses are as low as reasonably possible. The rates at which electric energy is sold to the members of the corporation are as high as the traffic will bear, and comparable to the rates charged by power and light companies in adjacent territory. . . . It is reasonable to assume that higher rates would result in restricting the development of new business and prolong the period of operating deficits. To have avoided a deficit for the year 1937 would have required a gross revenue 87 per cent greater than that actually received. It is obvious that no such result could be obtained by any increase in rates and further discussion of this matter would seem unnecessary.

Can't Earn Enough

"It is equally obvious that the deficit is not the result of abnormally high operating expenses. Exactly the opposite is true. The breakdown of operating expenses set forth in the Taxpayer's Report and in Exhibit 'A' indicates an unusually low ratio of operating expenses to the book value of the property. It is apparent that every item of expense has been cut to the bone. Such items as salaries, wages, rent and office expense are very much lower than similar items in the current practice of electric companies.

"As we have already discussed, the operating deficit is not a temporary condition, nor due to bad management. The lack of earning power is inherent in the property as located and would exist under any ownership or management.

"There is nothing to indicate that the property will have any rapid increase in earning power.

". . . it requires no argument to conclude that the property would not be 'desirable as an investment' even at half of the tentative value as fixed. No prudent investor would buy the property or an interest therein on any such basis. . . . The value of this property for the purposes of income and sale is obviously only a fraction of the reproduction cost."

SEC Discord

[*Continued from page 62*]

ministration moves for every one O'Connor opposed, and Sabath has been made a figurehead.

The analogy is not precisely correct, for the chairman of SEC does exercise powers of an executive character which a House committee chairman cannot.

The really discouraging phase of the SEC situation lies in the prospects not only for inaction—so far as new ventures in the electric industry are concerned—but for litigation. With the prevailing opinion, which has been steadily increasing for many months now, that the next Administration will be either Republican or conservative Democratic, no big company is going to accept an SEC decision which would be too tough, in its own estimation, if it could see a legal prospect of holding it up for eighteen months.

•

Stops Radio Sales

Kansas City Power & Light has discontinued its radio service department and the sale of radios. The company started selling radios the first week in September, 1925.

•

Will Redeem Debentures

Southwestern Gas & Electric Co. has called for redemption on May 11 its $2,250,000 of 4 per cent serial debentures, series A, due from 1941 to 1945.

•

FPC Sets Niagara Hearing

FPC has announced that its hearing on the application for amendment of license by the Niagara Falls Power Co. to divert an additional 275 cu.ft. per second of Niagara River waters through the company's Project No. 16 has been continued to May 8.

•

Tacoma Awards Contracts

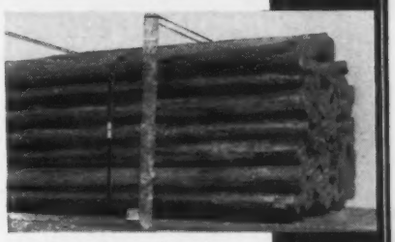
Board of Contracts and Awards of the city of Tacoma, Wash., has let the following contracts for the municipal lighting department: Allis-Chalmers Co., two contracts for interrupting capacity breakers, six 15-kva., 100,000-volt breakers, $6,557; six 15-kv., 500,000-volt breakers, $17,162; Love Electric Co., electric meters, $30,000, instrument transformers, $10,000; Graybar Electric Co., incandescent lamps, $10,000.

ACME UNIT-LOAD METHOD REDUCES POLE UNLOADING DANGERS

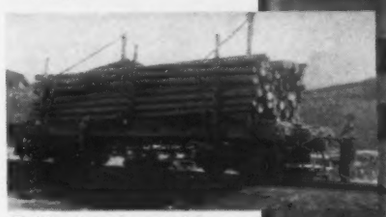
The receiver also benefits when the Acme Unit-load method is used to brace poles on flat cars. Personal injury hazards previously encountered in unloading are eliminated. The unloading crew has accurate control over each step of this safer—faster—more economical unloading procedure.

An increasing number of shippers are using this labor and time saving method of bracing cars. Delay and loss of poles in transit are avoided. And shipments arrive in excellent condition.

Acme Unit-load bands are easy to apply—placed around the poles and across the stakes, tensioned and sealed to form a large, secure unit. By following the simple unloading suggestions in the free Acme booklet maximum safety and economy are assured. Write for your copy today—there is no obligation.



1 *View of car braced with Acme Unit-Load Bands.*



2 *Showing how safely and easily bands are removed from side opposite unloading side.*

3 *Tension is gradually eased and poles roll safely off the car.*

MAIL THE COUPON

Find out how easily the Acme Unit-Load Method can solve *your* pole problem.

ACME STEEL COMPANY
2845 ARCHER AVENUE
CHICAGO, ILL.

Branches and Sales Offices in Principal Cities

Acme Steel Company
2845 Archer Ave., Chicago, Ill.
Send me a copy of the booklet about POLE SHIPMENT with suggested *safe* Unloading Procedures.
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Address .....
City..... State.....

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CHANGE AC TO DC

WITHOUT MOVING PARTS, GLASS BULBS, LIQUIDS, OR SPARKING CONTACTS. DRY — DURABLE — COMPACT — ECONOMICAL.

SPECIAL RECTIFIERS AND COMPLETE ASSEMBLIES

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Electromaster designed and introduced the flexible cable and plug.

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2. Plated strain relief clamp.
3. Heavy-duty rubber casing.
4. Sturdy bakelite cap.

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K-P-F ELECTRIC CO.
855 Howard St., San Francisco

Letters to the Editor

Polaroid for Glare Reduction

To the Editor of ELECTRICAL WORLD:

Thank you for bringing to our attention the references to the use of "Polaroid" light polarizing screens for control room lighting applications occurring in an article by W. B. Morton in the issue of October 8, 1938, of your magazine and in a subsequent letter by D. H. Tuck in the issue of November 19, 1939.

Mr. Tuck's statement about the use of Polaroid screens is based on perfectly sound and well-known theoretical fact. However, he fails to take into account fully the relaxations from perfection which are allowable and often necessary in engineering practice.

Theoretically, the polarizing angle in reflection from glass is as critical as you want to make it. In practice, the effect is seldom, if ever, perfect. It is difficult to keep glass sufficiently clean long enough to perform the experiment and it is a nuisance in one way or another to circumvent the effect of the finite area of most sources of light.

If we illuminate a sheet of glass with suitably polarized light from a finite source, the mean inclination of this incident light being at the polarizing angle, and view the reflection with the naked eye, the "glare" will be almost, but not quite, extinguished. Furthermore, if we use a Polaroid filter to polarize the illumination, a purple image of the source remains, because of the defects of polarization of Polaroid screens at the ends of the visible spectrum. But this type of glare reflection can be avoided by the simple expedient of so positioning the source that the reflection does not come to the observer's eye.

But this is only one-half the story. In general, there will be a fairly generous layer of atmospheric corruption on the glass, and no matter how the source of light is arranged, a certain amount of light will be reflected to the eye from the inclined facets of dust particles and the like. This type of glare is just as much of a nuisance as the other. This reflection has a certain mat character, and it can be dealt with very nicely with suitable Polaroid screens over properly positioned illuminators.

The design and functioning of the Polaroid desk lamp present a similar story. Here the glare from the inclined facets in the texture of paper is just as important as the specular glare from the surface of the paper as a whole. The latter is quenched by geometry and the former by polarization. Oil paintings offer a still better example of the same sort of thing.

Finally, in quenching glare from a mat surface or its equivalent, the choice of angles is not inconveniently critical, since for all practical purposes a 90 or 95 per cent glare reduction is just as good as 100 per cent.

MARTIN GRABAU,
Optical Engineer,
Polaroid Corporation,
Boston, Mass.

To the Editor of ELECTRICAL WORLD:

Mr. Grabau's explanation of the effect of using "Polaroid" over the "Controlens" of a control board lighting system presents a new angle to lighting—that is, the effect of dirt on a piece of glass that must be looked through. He agrees with me that the specular reflection is best eliminated by reflecting it away from the eye, as outlined in my letter of November 19, 1938. The substitution of Polaroid for soap and water, however, never occurred to me. Upon reading his letter, I at once rigged up a meter with dirty face and sure enough the dirt practically disappeared when the light was polarized. However, in actual practice I doubt the desirability of going to the expense of Polaroid at $20 per square foot, because good housekeeping calls for fairly clean meter faces and the Polaroid absorbs about 50 per cent of the light. So unless water is scarce and help indolent I don't think I would recommend Polaroid for control board lighting.

DAVIS H. TUCK,
Electrical Engineer
Holophane Company, Inc.
New York.

•

Vocational Guidance Film in Electrical Engineering?

To the Editor of ELECTRICAL WORLD:

Would it be unreasonable to hope that some agency will some day produce and make available a "vocational guidance" film to show young folks what the profession of electrical engineering leads to? My notion is somewhat as follows:

The electrical engineer has to do a lot of hard, grinding, monotonous work, as does every one else who accomplishes anything worth while. The average young fellow making his life decision as to employment makes up his picture of different professions from

stories, news articles and the few examples with which he may come in contact. In the case of electrical engineering, these contacts are woefully few, so that the usual young man has a very one-sided, distorted notion and seldom has any idea of the scope, levels of responsibility, or diversity of interests covered by our profession.

Neither does he surmise the demands for special abilities and training, the emotional strain of an emergency, the financial responsibility on his judgment, or obligation for the physical prosperity and well-being of subordinates that may be met at times or as a regular routine in different phases of the profession.

In an endeavor partially to fill this need, a film might portray typical situations of electrical engineering in research, design, manufacturing, communication, transportation, metallurgy, lighting, power generation, industrial applications, electrotherapeutics, and so on. Such a picture might very well require two or three reels.

If it were first tried out on freshmen in technical schools, it might later do an immeasurable amount of good in guidance work if presented in high schools, through the encouragement of the proper type of man. In my opinion we have too many young men in our technical schools who would make good radio service men, station operators and mechanics, but never at any time too many ambitious fellows with character, imagination, courage and real ability. These constitute the type I would hope to attract by the presentation of the true situation—a picture as to the range of possibilities for a good man fifteen to twenty years after graduation.

J. Hugo Johnson,
Head Dept. of Electrical Engineering,
University of Idaho, Moscow.

•

Kansas City Utility Shows Sharp Increase in Taxes

Kansas City Power & Light Co., in a full-page advertisement in the Kansas City *Journal*, points out that wages to employees total $10,500 a day and that it is these wages of the 2,017 employees which help support city business. The company states that it pays $5,800 a day in direct taxes and it is these taxes which help support the activities of the local government.

Since 1915, the company states, customers have increased 265 per cent, employees 345 per cent, payrolls 796 per cent and taxes have increased 2,090 per cent. "Yet, in spite of increased costs, electric rates have steadily decreased."

STATES TESTING EQUIPMENT

TEST TABLES

Form F A

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Picture These Tables in YOUR Department!

Safer, handier, better equipped—these tables meet the demand of the times.

1. Tests Socket and Bottom Terminal meters.
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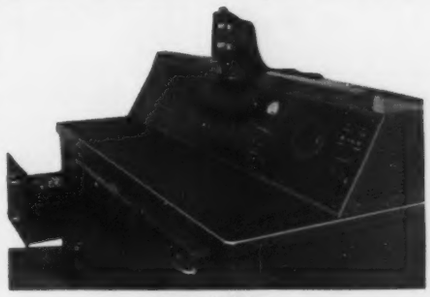
See Cat. No. 1, Sec. 3B for full details.



Form "FA"

The States Company
New Park Ave. Hartford, Conn.

STATES TESTING EQUIPMENT

OSMOPLASTIC GROUNDLINE TREATMENT

Photo shows employee of Pennsylvania Power & Light Co. groundline treating a pole with Osmoplastic. Over 25,000 poles treated by this property to date.

Is Extending Service Life of Standing Poles for 50 Leading Utilities!

ACTUAL field experience of America's leading utilities proves that Osmoplastic Groundline Treatment checks decay and extends service life of standing poles. Treatment is as simple as A-B-C and costs only $1 to $2 per pole; one additional year of service life pays for Osmoplastic treatment, which extends the pole's service life at least 7 to 10 years. Write for complete details on this effective but inexpensive treatment which is saving substantial sums for utilities throughout the nation.

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Another
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Steam and Hydraulic Power Plants
Transmission System—Substations
REPORTS AND APPRAISALS
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Now, more than ever before, industry should take advantage of the opportunity to use the broad experience and knowledge of the consultant and profit by such use.

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Sensible, practical methods for improving your relations with others—securing cooperation of superiors, associates, and subordinates—both in and out of business life. Send $2.50 for a copy on 10 days' approval.

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Read GETTING ALONG WITH PEOPLE
by MILTON WRIGHT

Gets Extension of Time

Granting "for good cause shown" the company's application for an extension of time, the Federal Power Commission has extended to July 25 the time within which the Louisville Gas & Electric Co. is required to file its response to the commission's show cause order as to why the journal entry in the company's accounts transferring $601,973 from electric plant in process of reclassification to electric plant acquisition adjustments should not be suspended and the amount transferred as a charge against the company's appropriate surplus account.

•

Block Oklahoma Merger

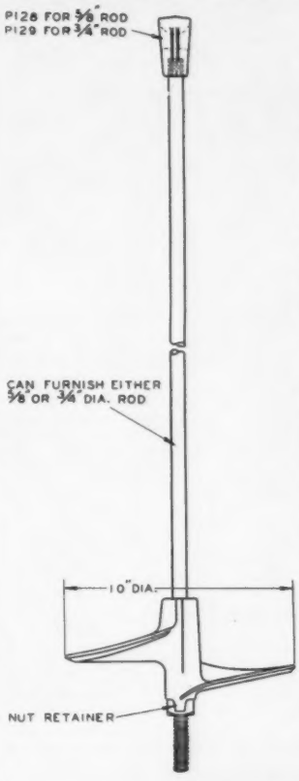
Merger of the Oklahoma Power & Water Co. with the Public Service Co. of Sand Springs, Okla., has been temporarily blocked by the successful efforts of Senator H. M. Curnutt, floor leader, to prevent bringing out of committee a resolution approving the measure. Under state laws it is necessary for the state corporation commission to approve such a consolidation and the move must also have legislative approval.

•

Approve Canadian Plan

New plans for financing the St. Maurice Power Corp.'s 160,000-hp. development on the St. Maurice River, undertaken jointly by the Shawinigan Water & Power Co. and the Brown Corp., have been approved by the Quebec Electricity Board. Shawinigan has advanced $2,200,000 and $300,000 more will be required in a few weeks. St. Maurice Power has been authorized to create $20,000,000 of first mortgage bonds. The first series will be limited to $10,000,000 and carry a coupon of 5 per cent, maturing on April 1, 1969.

M. I. F. Screw Anchor Proved in Service



This new M.I.F. 10" Screw Anchor was used on a repeat order basis to the extent of 2,000 units last year in one State only. This year we are offering it on a national scale for use in those areas where a Screw Anchor is practicable.

Trial orders will be accepted at $1.10 each, F.O.B. Branford, for unit weighing just under six lbs. less the rod, and testing to over 20,000 lbs. before failure under tension. Rated at 10,000 lbs. in average soils suitable for Screw Anchors.

Installed with a pipe tool priced at $4.00, F.O.B. Branford. Anchor Rods are of the M.I.F. assembled type with separate thimbleless eye, as illustrated, and are competitively priced.

We recommend a trial installation with sample unit furnished without charge and installation tool loaned—latter to be returned to us in event the trial installation does not lead to an initial order for 50 or more units, in which event the tool may be retained without charge. Advise length of rod required, also whether ⅝" or ¾", and whether single eye or double eye type.

Misc. M. I. F. Pole Hardware Specialties — *Williams Pole Mounts — Pole Stubbing Clamps — Aerial Cable Messenger Clamps and Insulated Hangers — Malleable Secondary Racks and Clevises — Malleable Crossarm Gains — Transformer Gain Plates and Kick Arms — Through-bolt Guy Hooks, Eye Nuts, Bolt Eyes, Curved Ribbed Washers, etc.*

Send for Screw Anchor Data Sheet No. 2-1575

MALLEABLE IRON FITTINGS COMPANY
Pole Hardware Dept. [Factory and New England Sales Office] **Branford, Connecticut**
New York Sales Office: Thirty Church Street
Canadian Mfg. Distributor:
LINE & CABLE ACCESSORIES, Ltd., Toronto

BURNDY

SERVIT

No Worry
About the LINE SPLICES When You Do the Jobs with NATIONAL NICOPRESS Sleeves and Tools

For Power distribution splices, NICOPRESS makes the grade 100 per cent every time. With these highly efficient compression tools and sleeves the job of making the splices is quickly and easily done. Every completed splice has maximum strength equalling or surpassing the rated breaking strength of the wire.

All Nicopress splices are tight as a weld and conductors will not pull out. Neither air nor moisture can seep into a completed splice, so corrosion is minimized and the conductivity of the wire maintained.

Tools are light, convenient to carry and easy to handle and operate.

Tools and sleeves are available for practically all types and sizes of wire used for Power distribution lines. Prices and samples are yours for the asking —no obligation. Write today.

THE NATIONAL TELEPHONE SUPPLY COMPANY
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Proposals, 40 cents a line an insertion.

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Box Numbers in care of any of our New York, Chicago, or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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The advertising rate is $6.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

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ELECTRICAL ENGINEER and superintendent. B.S.E.E. Fourteen years broad experience in chemical, automatic, utility plants. Engineering, supervision, maintenance, operation. Seeks connection as electrical engineer or superintendent of industrial plant or municipal system. PW-620, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

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Selling Agencies—Sales Executives
Salesmen—Additional Lines

OPPORTUNITY WANTED

MANUFACTURER'S AGENT calling on industrial, electrical and aircraft manufacturers in New England, interested in acquiring exclusive representation for one additional account. Nationally known, established production materials, requiring engineering knowledge, preferred. MA-621, Electrical World, 330 W. 42nd St., New York, N. Y.

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Can you use thirty-six salesmen and twelve warehouses strategically located throughout the United States, to insure for your product real national representation? If so, and your line is non-competitive, write us.

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Dept. W-220 Church St.—New York City
National Sales Agents for
CLIFTON CONDUIT RATTAN FITTINGS
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U. S. Government

TENNESSEE VALLEY AUTHORITY, KNOXVILLE, TENNESSEE. Sealed bids, in duplicate, will be received until 10:00 A.M., Central Standard Time, May 10, 1939, and then publicly opened, for *furnishing Main Control Switchboards* for the Hiwassee Power Plant. Bidding Documents, for which there is no charge, available April 19, 1939, at above office. C. H. Garity, Director of Purchases. (61)

WANTED

ANYTHING within reason that is wanted in the field served by Electrical World can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

REPRESENTATION WANTED

A manufacturer of pole line specialties in the Middle West desires sales representation in Ohio, Pennsylvania and Atlantic Seaboard.

RW-622, Electrical World,
520 N. Michigan Ave., Chicago, Ill.

WANTED

WANTED
MOTOR GENERATOR SETS AND ROTARY CONVERTERS

We will buy outright for spot cash motor generator sets and rotary converters from 300 to 1000 K.W. 250-275 volt D.C. 2300 to 6600 volt A.C. Mail us your list of surplus equipment.

COAL MINE EQUIPMENT SALES CO.
Office and Warehouse Terre Haute, Indiana

FOR SALE

(Additional For Sale Ads on page 131)

MOTORS

50 H.P. General Electric, Type I.L. 2300 Volt, 514 R.P.M. 60 Cy. 3 Phase Motor with Compensator, $225.00.

10 H.P. Wagner Fynn Weichsel, 440 Volt, 60 Cy. 3 Phase, 1200 R.P.M. Motor with Starter, $125.00.

ELECTRICAL SURPLUS CO.
1885 Milwaukee Ave. CHICAGO.

DIESEL UNITS

2—1000 KVA, Westinghouse alternators, with McIntosh-Seymour diesel engines. Practically new.

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